

*On Early Asiatic Fire Weapons.*—By MAJOR-GENERAL  
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The use of fire in some form or other in war, must have suggested itself to fighting people at a very early period in all countries, and has probably been practised in all ages, both for attack and for defence. To carry fire and sword into an enemy's territory is the common representation of active and desolating aggression. And from the simple and direct application of fire to the destruction of dwellings and other property, it was a natural step to devise ways of applying it from a distance by means of burning matter attached to missiles.

In our day the term *fire-arms* is applied to weapons which, by means of explosive matter, project heavy bodies to a distance, though no fire may be carried by the missile itself. Early fire weapons in all countries sent the fire with the missile, discharging it by the mechanical appliances in ordinary use for throwing missiles of other kinds.

When the use of igneous projectiles of any kind came to be commonly practised, endeavour was then made to devise means of projecting them with force that they might reach to a greater distance; and, at the same time, of making them as tenacious as possible of the fire they carried, and as violent as possible in their combustion. Success in the first of these objects would, with the more ordinary inflammable materials, defeat the second,\* and a great advantage was gained by the use, for this purpose, of combustibles of some more powerful kind.

The earliest kinds of fire-missiles appear to have been much the same everywhere—arrows tipped with oiled flax, or wrapped with some soft matter soaked in oil, and discharged in the ordinary way from bows. Such was the simple contrivance which, nearly five centuries before our era, the Persians who had occupied Mars Hill, made use of to fire the palisades of the defenders of the Acropolis.† And such, probably with little variation, were the fire-arrows‡ that were used in all countries for some hundreds of years. After a time, the improvement was introduced of putting the fire in a small perforated case, or hollow enlargement of the shaft, a little behind the point, which was roughly barbed to make it hold hard in the object assailed and keep the fire applied so long as it lasted. This was the *malleolus*, as

\* So with one of the early forms of fire-arrow,—*Et si emissa lentius arcu invalido (ictu enim rapidiore exstinguitur) haeserit usquam, tenaciter cremat, &c.* Ammian. Marcell., XXIII, 4, 15 and XXIII, 6, 37.

† Herod., VIII. 52.

‡ Alluded to generally in Eph. vi. 16 as βέλη πεπυρωμένα, and more or less specifically by various authors as πυρφόροι διστοί, πυρφόρα τοξεύματα, τὰ πυροβόλα, &c.



it was made in the fourth century;\* a missile which seems to have been familiar for a long time under that name,† and which was no doubt originally made hammer-headed in some sense, and afterwards had the fire case put into this more effective shape. It is of this improved missile that Ammianus says it had to be projected with only moderate force, as otherwise the fire was apt to go out in the course of its flight. The fire-bearing javelin (called *falarica*), which was thrown by hand or with greater force by a tormentum or twisted cord apparatus, either had the ignited matter wrapped round the point‡ or, like the malleolus, carried the fire in a metal case or cage.§ And from the war engines were also thrown vessels of combustibles by themselves.||

Each of these kinds of burning missiles acquired increased efficiency by the employment of materials giving a more effective and persistent flame; and petroleum or naphtha, when obtainable, or other bituminous products, came to be used in place of the vegetable oils.¶ In countries in which these mineral oils are found, in some form or other, the effective character of the fire used in this way in war may be generally ascribed to the use of materials of this class. Naphtha appears to have been the first and chief of the materials used for producing the Greek Fire,\*\* which was the most distinctive and destructive of the war-missiles of the middle ages in the East. Other inflammable substances, combined with naphtha or petroleum in the Greek Fire compositions, came next to be used in similar manner without the oil. And these dry compounds, of various proportions, used at first only in this way, reached their highest power and application when, in the form of gunpowder, the explosive material was employed not merely for the purpose of

\* Amm. Marcell., XXIII, 4, 14.

† —plena omnia malleolorum ad urbis incendia comparatorum (Cic., Pro Mil., XXIV).

‡ As used by the defenders of Saguntum against Hannibal:—ad extremum unde ferrum exstabat. Id sicut in pilo quadratum stuppa circumligabant liniebantque pice. (Liv. XXI, 8.) And the flame, it is stated, instead of being extinguished, gained increased force in its passage through the air.

§ Vegetius, De Re Militari, IV. XVIII.

|| ἀγγεῖα πυρφόρα. Polyb., XXI, 5, 1. Arrian, Exp. Alex. I, 21, 22, 23; II, 19. Diod. Sic., XX, 4. Tac., Hist., II, 21. Virg., Æn., X, 130. 1. Maccab., VI, 51. Ockley, Hist. of the Saracens, 427).

¶ Bitumen, sulphur, picem liquidam, oleum quod incendiarium vocant ad exurendas hostium machinas, convenit praeparare. Vegetius, De Re Militari, IV, 8, and V, 14. ἀγγεῖα δὲ θείου καὶ ἀσφάλτου ἐμπλησάμενοι καὶ φαρμάκου ὅπερ Μῆδοι μὲν νάφθαν καλοῦσιν, Ἕλληνες δὲ Μηδείας ἔλαιον. (Procopius, de Bell. Goth., quoted in Lalanne's Recherches sur le Feu Grégeois, p. 48).

\*\* "It would seem that the principal ingredient of the Greek Fire was naphtha or liquid bitumen." Gibbon, Chap. LI.



feeding the fire in the projectile, but as the agent for discharging it. This last is the great step from medieval to modern artillery.

The advance from one kind of fire-missile and fire material to others more effective has not, there is reason to believe, been made by immediate invention or discovery. Local conditions have originated, and practical experience has extended and modified, the use of various preparations and contrivances for this purpose. M. Reinaud, in the work\* issued jointly by him and Colonel Favé in 1845, has brought together a number of extracts from Arabic works giving receipts for the preparation of war-fire of sorts, showing that the compositions which it has been the custom to call *Greek Fire* were various, and that many of them contained one or two or all of the ingredients of gunpowder, before the times to which the invention of gunpowder is ordinarily ascribed. From these early receipts for fire-works and fire-missiles, and from the various accounts of Greek Fire and its effects, it would appear that modifications of these compositions, introduced from time to time, led up to the preparation of gunpowder; which yet was not what we understand by *gun-powder* till it came to be prepared in a form adapting it for use as the propelling agent in guns, and to be so used.

From very simple and rude arrangements for using the aid of fire in fighting, gradual progress in various ways had been generally made before gunpowder times; yet simple and rude arrangements continued to be used, even after better devices were known, when these were not available, or when the others were sufficient and suitable for the occasion. Sufficiently primitive was the method adopted by Timur, of carrying fire into the ranks of an enemy, when, in his battle before Dihlí in A. D. 1399, he caused a number of camels to be laden with dry grass and driven towards the opposing force with the grass set on fire, on sight of which the enemy's elephants fled.† This was a resort to a very rude contrivance at a time when modes of projecting fire to a distance were well known, and when fire was employed

\* *Historie de l'Artillerie*, 1re partie. Du Feu Grégeois, &c., pp. 25 et seq. Some notices of the early use, among the Arabs, of the ingredients of gunpowder, are given in a "History of the Art of War and Organisation of Armies in Europe" by Dr. Hermann Meynert; a book I have not seen and only know of from a newspaper notice.

† This is one of the incidents of the Indian expedition related to Clavijo when he was residing at the court of Timur at Samarqand. (*Embassy of Ruy Gonzalez de Clavijo to the Court of Timour*, A. D. 1403-6, p. 153.) According to other accounts, they were buffaloes that he used, tied together in pairs with burning bushes between them (*Maurice's Modern History of Hindostan*, II, 20). Somewhat similar, but with a different purpose, was Hannibal's device when in camp before Q. Fabius Maximus, B. C. 200. *Obductâ nocte, sarmenta in cornibus juvencorum deligata incendit, ejusque generis multitudinem magnam dispalatam immisit.* (*Corn. Nep., Hann. V.*)



of more effective kinds for creating the alarm that was desired. Such fire-missiles were familiar to Timur himself and his predecessors. At the siege of Otrár by Chingiz Khán, A. D. 1219, the defenders made good use of burning darts, to the injury of the besiegers' engines. The following year, in besieging the citadel of Bukhárá after gaining the town, he threw in pots of burning naphtha. He used Greek Fire in his attack on Khívá, the same year, and it was used by and against him on other occasions.\* Timur eight years before his invasion of India, had made use of Greek Fire discharged from his boats in his attack on a small town on the shores of the Caspian.† In India he encountered fire missiles of other kinds at his attack on Bhatnír, when "the besieged cast down in showers arrows and stones and fireworks upon the heads of the assailants."‡ Timur himself relates that Sultán Mahmúd, when he attacked him at Dihlí, had elephants covered with armour, most of them carrying howdas "in which were throwers of grenades (*ra'd-andáz*), fireworks (*átash-báz*), and rockets (*takhsh-andáz*)."*§* Timur, in his engagement with Báyzíd I., before Angora, three years after the Dihlí battle, had a special body of men for throwing Greek Fire.|| What was the nature of the various fireworks used by Sultán Mahmúd at Dihlí, and by the defenders of Bhatnír, is not indicated. In the regions where Greek Fire was used by Chingiz and Timur, naphtha abounded or was readily obtainable, and it is, in some of the instances, named as the material used. There does not seem to be reason to believe that Timur was acquainted with gunpowder, as General Cunningham has supposed.¶ The use of Greek Fire, or of missiles answering to the descriptions of the fire generally so designated, was practised chiefly in countries where naphtha, petroleum, or bitumen, is produced, and more rarely elsewhere. It is stated that Edward I., when besieging Stirling Castle in 1304, after calling for large supplies of balistæ, quarrells, bows, and arrows, from York, Lincoln, and London, "gave orders for the employment of a new and dreadful instrument of destruction, the Greek Fire, with which he had probably become acquainted in the East."\*\* There is nothing to show what the composition was, but it is most probable that this, as well as the fireworks which Timur encountered at Dihlí and at Bhatnír, was composed of some of the *dry* materials used elsewhere combined with naphtha,—the ingredients of the future gunpowder.

\* *Petis de la Croix, History of Genghiscan*, pp. 166, &c., and 190, &c., from Mirkhwánd and others.

† *Life of Timour Beg*, prefixed to Markham's translation of Clavijo.

‡ *Malfúzát i Tímúrí*, in Sir H. Elliot's *Historians of India*, by Prof. Dowson, III, 424.

§ The same, III, 439.

|| Langlès, *Vie de Timour*, p. 88, (quoting Sharafuddín).

¶ Essay on the Arian Order of Architecture, J. A. S. B., XVII, 1848, ii., 244.

\*\* For this statement Tytler refers to the *Liber Garderobae*, or Wardrobe Book, of Edward I, p. 52 (*Hist. of Scotland*, I, 181).



From the account above referred to of the defence of Bhatnir, it would appear that the fire was not projected to a distance, but thrown down from above on the attacking party when they came near. The direct delivery of hot matter on the heads of assailants, and of fire upon their engines, when they approached close to the walls, is a means of offensive defence which must have occurred to most people, and for which special arrangements were often made in the construction of defensible places:—

Where upon tower and turret head  
The seething pitch and molten lead  
Reek'd like a witch's cauldron red.\*

The kind of defence is one which was by no means superseded by the possession of means of projecting the fire or scalding matter to a distance; but it was an arrangement of more prominent importance, and which received very special care and attention, in times when there was both more hand-to-hand work in fighting, and closer operations in the attack and defence of fortified positions. Sir Richard Maitland's defence of his castle of Lander in 1296 is commemorated in the ballad which tells us how he cast down combustibles upon the roofed machine called the *sow* (a British version of *testudo* or *musculus*) when it was brought close up:—

They laid their sowies to the wall  
Wi' mony a heavy peal,  
But he threw ower to them agen  
Baith pitch and tar barrel.†

a plan which was followed also, not without much art and skilfully prepared appliances, by the Flemish engineer, John Crab, in the defence of Berwick when besieged by Edward II. in 1319. Barbour relates how to "throw Crabys cunsail" they rigged up a *crain* "rynnand on quheills", that it might be readily brought to any part of the walls when required:

And pyk, and ter, als haiff thai tane,  
And lynt, and herds,‡ and brymstane,  
And dry treyis that wele wald brin.

of which they made "gret fagalds" to be lifted over by the machine and dropped, burning, on the assailants' engines, which were at the same time laid hold of with grappling hooks and chains to prevent their removal.

\* *Lay of the Last Minstrel.*

Hi jaculis, illi certant defendere saxis,

Molirique ignem, nervoque aptare sagittas. (*Æn.* X, 130.)

† *Auld Maitland.* (Minstrelsy of the Scottish Border.)

It was an exact repetition of an old proceeding. "Cupas tædâ ac pice refertas incendunt, easque de muro in musculum devolvunt." (*Cæsar, de Bell. Civ., II. 11.*) This is what the defenders of Marseilles did, B. C. 49.

‡ Refuse of flax.



And giff the sow come to the wall,  
 To lat it brynard on her fall,  
 And with stark chenyéis hald it thar,  
 Quhill all were brynt up that thar war.\*

For exposure to any such direct and plentiful application of fire at close quarters some roof covering of a not very inflammable kind was needed. The *musculus* which came under the fire of the Massilian tar-barrels,† was prepared for it, sheltered by tiled roofing covered with earth and hides. Protection, also, against fire missiles discharged from a distance needed, in order to answer its purpose, to be adapted to the character of the burning matter which it had to resist; and shelter which was sufficient against the more innocent combustibles was not fitted to encounter burning naphtha or Greek Fire. Against the more primitive fire-arrows, leathern mantlets served for the protection of the soldiers and workmen, and for the defensive covering of the towers and engines. At the attack on Bámián by Chingiz Khán, A. D. 1221, an order was given to kill as many horses and cows as would provide hides to cover the besieging engines, by which it is said they were effectually protected. The fire thrown by the defenders did them no harm. But at Khojand, two years before, when the besieged threw burning naphtha, additional shelter was used, made of sheets of felt covered with clay, and moistened with vinegar.‡ By many writers vinegar is mentioned as the best or only means of quenching Greek Fire.§ Against the fire arrows and

\* Barbour, *The Bruce*, Book XVII.

† Thucyd., II, 75. Arrian., *Exp. Alex.*, II, 18. When we are told of a stouter protection being insufficient against a phalarica,—

Sed magnum stridens contorta phalarica venit  
 Fulminis acta modo; quam nec duo taurea terga  
 Nec duplici squamâ lorica fidelis et auro  
 Sustinuit. (Virg. *Æn.* IX, 705.)

we may infer that this had nothing to do with the kind of fire with which the javelin was charged, but is meant to indicate, in poetical fashion, the force with which it was launched by the hand of a hero.

‡ Petis de la Croix, *Hist. of Genghiscan*, 307, 190. In the First Crusade an engine is said to have been made to Godfrey's order by

“a cunning architect,  
 William, of all the Genoas lord and guide.”  
 “whereof he clothed the sides  
 Against the balls of fire with raw bull's hides.”

Tasso, *Jer. Del.* (Fairfax's translation), XVIII, 41, 43.

But this protection was not effectual. It could not withstand the Greek Fire (XVIII, 84).

§ So in two Latin Chroniclers quoted by Lalanne in his *Recherches sur le Feu Grégeois*, p. 30;—“Inextinguibilem ab omni re præter acetum” (*Ditmar*).—“Græcum ignem qui nullo præter aceti liquore exstinguitur.” (*Luitprand.*) A very old writer on military affairs, Æneas Poliorceticus, (about 360, B. C.) says (ch. 34) that the fire



fire *Páo* of the Tartars, the Chinese (A. D. 1273) constructed defensive covering for their horses of rice straw ropes covered with clay.\*

It is when Greek Fire comes to be employed that the *noise* is specially noticed; which has given occasion to the surmise that it was in reality gunpowder. A French writer who has made researches on the subject (M. Lalanne), endeavours to show that it was nothing else than gunpowder, used as such, and that the tubes from which it was sometimes discharged, were cannon. But it may be observed that the noise mentioned in connection with Greek Fire was the noise accompanying the flight and combustion or explosion of the burning missile itself, as it came among the people against whom it was launched. Noises of a kind that would be alarming to those unused to this instrument of warfare, may accompany the combustion of naphtha or petroleum, which appears generally to have been the chief ingredient of this fire composition. And *any* noise would contribute to the terror occasioned by encountering a hostile fire so formidable on other accounts, and would be magnified by the apprehensions of those exposed to it. And their accounts of it constantly exhibit the perturbation it caused.

They come not,—while his fierce beleaguers pour  
Engines of havoc in, unknown before  
And horrible as new; javelins that fly  
Enwreath'd with smoky flames through the dark sky,  
And red hot globes that, opening as they mount,  
Discharge, as from a kindled naphtha fount,  
Showers of consuming fire o'er all below.†

The most graphic accounts of the Greek Fire, "horrible as new," and of the wonder and alarm which it created, are given in the pleasant pages

thrown by the enemy is to be put out with vinegar. He goes on to mention (ch. 35) a certain *πῦρ ἱσχυρόν*, which he says can by no means be extinguished; and Casaubon, in his comment, thinks from the terms used that though certain materials are named (pitch, sulphur, &c.), something more is possibly intended, of the nature of Greek Fire. (*Isaaci Casauboni in Aeneam Notæ*, 587.)

\* Reinaud and Favé, *Feu Grégeois*, p. 196. Yule's *Marco Polo*, 2nd Ed., II, 154.

† *Lalla Rookh*. *The Veiled Prophet*. Moore's note, along with other references, notices Gibbon's account of the Greek Fire—"It was either launched in red-hot balls of stone and iron, or darted in arrows or javelins twisted round with flax and tow which had deeply imbibed the inflammable oil." Fire missiles of the same general character, and formidable quite as much on account of their novelty to those against whom they were used as on account of their real power or destructiveness, were in use long before anything of the kind bore the name of Greek Fire. "The Rhodians had engines on board their ships, by means of which they threw fire upon those of the enemy. This probably resembled the substance which in later times was called Grecian fire: to judge of it from the manner in which the Greek historians speak of it, it was not thrown with rockets, and was certainly something inextinguishable and not generally known." (*Niebuhr's Lectures on the History of Rome*, by Schmidt, II, 184.)



of the Sire de Joinville's History of St. Louis. "La manière du feu grégois estoit tele que il venoit bien devant aussi gros comme un tonnel de verjus, et la queue du feu qui partoît de li, estoit bien aussi grant comme un grant glaive. Il faisoit tele noise au venir, que il sembloit que ce feust la foudre du ciel; il sembloit un dragon qui volast par l'air. Tant getoit grant clarté que l'on véoit parmi l'ost comme se il feust jour, pour la grant foison du feu qui getoit la grant clarté."\* This was in Egypt, in 1249. It was discharged from the engines called *perriere* (pierrière) upon the crusaders' *chas-chastiaus*, or towers, and against their stockades. Again it is described as having been thrown by hand, in what we may suppose to have been something like grenades. "Au darrien il amenèrent un vilain à pié, qui leur geta troiz foiz feu grégois. L'une des foiz requelli Guillaume de Boon le pot de feu grégois à sa roelle; car se il se feust pris à riens sur li, il eust esté ars."† And again attached to arrows, "—— si grant foison de pylés à tout le feu grégois, que il sembloit que les estoiles du ciel chéissent."‡

Hallam, in noticing Joinville's account of the Greek Fire, calls it "an instrument of warfare almost as surprising and terrible as gunpowder."§ And in another place he refers to a frequently-quoted passage of an Arabic work,|| written just about the time of Joinville's first-mentioned experience of Greek Fire, and which mentions, Hallam says, the use of gunpowder in engines of war, "though they may seem to have been rather like our fireworks than artillery." Quoting from Casiri's Latin translation, "*serpunt susurrantque scorpiones circumligati ac pulvere nitrato incensi, unde explosi fulgurant ac incendunt*," he says "one would be glad to know whether *pulvis nitratus* is a fair translation." If Mr. Hallam had had the advantage of seeing the results of the researches of M.M. Reinaud and Favé, he would (although the translation is shown to be open to objection) have had no occasion to question the literal *pulvis nitratus*, without coming to the conclusion, as he does, that "there can on the whole be no doubt that gunpowder is meant."¶ The description which follows the passage quoted above is not very different from other accounts of Greek Fire, which indicate

\* *L'Histoire de Saint Louis*, Ch. XLIII.

† *Ibidem*, Ch. XLIX.

‡ *Ibidem*, Ch. LXIII.

§ *Middle Ages*, I, i., p. 41 (ed. 1860).

|| In Casiri, *Bibl. Arab. Hispan.*, t. ii, p. 7. (Reference in Hallam.)

¶ *Middle Ages*, I, 479. M. Reinaud notices that the word *bārūd*, used in the original of the passage referred to, is applied both to nitre and to gunpowder. He gives the passage in the Arabic, and a corrected translation in French, and adds, "On voit que Casiri, qui traduisait *bārūd* par *pulvere nitrato*, et qui ne connaissait pas d'autre propriété de la poudre que l'explosion, en a introduit l'idée dans sa traduction. Voulant donner un sens à ce passage, il était naturellement amené à y voir l'emploi que nous faisons maintenant de la poudre." (*Reinaud and Favé, Feu Grég.*, 67.)



some material like petroleum, persistent in burning, and readily laying hold of, and setting fire to, objects with which it came in contact.

In a history of the early Muhammadan occupation of Egypt, called the *Maurid al-latâfat*, where mention is made of the use of naphtha for fiery missiles, in A. H. 532 (A. D. 1138), the English translator says in his note, "Utrum auctor noster per vocabulum Naphtham significare velit compositionem illam quam plurimi antiqui scriptores nomine *Ignis Græci* commemorârunt, an nostrum *Pulverem tormentorium*, nescio."\* As the author says the missiles were fed with naphtha (نَافْثَا), there need be no doubt. As elsewhere, other materials may have been added, but there is nothing to indicate this. The translator, however, thinks the supposition that possibly gunpowder was used, is supported both by the passage from Casiri referred to by Hallam, and by another account of a still earlier date. "Et quidem apud Arabas vetustissimum pulveris nitrati usum esse liquet; refert Elmacinus, Lib. I. Hist. Sar., 'Eodem hocce anno (scil. A. H. 71, [A. D. 690]), Hajaz arcâ premens obsidione Meccam, manganis et mortariis, ope naphthæ et ignis in Cabam jactis, illius tecta diruit, combussit et in cineram redegit.'" The names applied to the engines might raise some question, but the naphtha is there. And in many other instances naphtha is distinctly mentioned, by oriental and other writers, as thus used in medieval fire missiles. To which, in the West, people have been accustomed to give the name of Greek Fire.†

But, on other grounds besides the mention of *pulvis nitratus* in some of the Greek Fire compositions, it has been inferred that gunpowder was known, as a source of power for propulsion as well as a pyrotechnic composition, and that cannon were used, in times long anterior to those of the really known and certain application of gunpowder to the purposes of modern artillery. In particular, the frequent use of *tubes* for the discharge of the

\* *Maured Allatafet*, ed. J. D. Carlyle, A. M.

† Advenit etiam legatus Kaliphæ juvenis illustris, secum vehens naphthæ duo onera, multitudinemque naphthariorum artificum in ignibus jaculandis. (*Bahâ ud-dîn*, transl. by Schultens, quoted by Lalanne, *Recherches sur le Feu Grégeois*, p. 41, note.) Tasso (La Gerus., Lib. XII, 17) makes the magician Ismeno prepare a composition for burning the war engines of the enemy, of which composition a note by one of his editors, Signor Pietro Fraticelli, says, "Dal miscuglio di qui parla Ismeno, dover risulturne il così detto *fuoco greco*, &c." "Questo fuoco," he goes on to say, quoting the Military Dictionary of Giuseppe Grassi, "e invenzione antichissima de' Persiani, i quali adoperavano il nafta come principale ingrediente di esso." And he adds "I Saraceni lo componevano in quel tempo col nafta o petrolio, che si raccoglie nelle vicinanze di Bagdad." And the poet, further on (XVIII, 47), when

Ismen prepara

Copia di fochi inusitata e rara,  
says that the asphalt of the Dead Sea was used in the composition.



Greek Fire, and the fact of a *report* of some kind being often mentioned in connection with it, have helped to give occasion to this belief.

Gibbon, in his account of the siege of Constantinople, A. D. 717, after observing that the principal ingredient of Greek Fire seems to have been naphtha or liquid bitumen, says that, when employed at sea, it was "most commonly blown through long tubes of copper, which were planted on the prow of a galley, and fancifully shaped into the mouths of savage monsters, that seemed to vomit a stream of liquid and consuming fire."\* A little earlier than the occasion to which Gibbon's account relates, a similar mode of discharging naphtha fire on land appears to have been practised by the Arab invaders of Sind (A. H. 93, A. D. 712). Their employment of naphtha in their battles with the Hindu inhabitants is noticed repeatedly in the *Chachnámah*, in passages of which extracts are given in Vol. I, of Prof. Dowson's edition of Sir H. Elliot's *Muhammadan Historians of India*.† When the enemy's elephants approached, Muhammad Kásim ordered his naphtha-throwers to attack them. Burnes, quoting from another part of the *Chachnámah*, not included in Sir H. Elliot's extracts, or from another version, says the Muhammadans, in the battle at Alor, when the elephants were brought against them, had to assail them with combustibles. They "filled their pipes, and returned with them to dart fire at the elephants." Burnes, in his foot-note, supposes pipes for smoking to be meant, and remarks that it must have been bhang or hemp which they smoked in those days, as tobacco was not known.‡ But apparently the word should have been *tubes*. They were probably like what were called in the West *χειροσίφωνα*, or hand-tubes, employed for the same purpose,§ in which either naphtha or special fire compositions might be used, and through which the fire was discharged, or *in* which it was thrown. One of the meanings given by Golius to the word *naḥāṭ* or *naḥḥāṭ* is "instrumentum æneum quod exploditur naphthæ seu pulveris pyrii ope, scil. tormentum bellicum."|| He seems to intimate that a name originally connected with naphtha may have continued to be used to designate the weapon, even after gunpowder or other

\* "We got into a boat like a fire ship," Ibn Baṭūṭa says, in telling of a trip on a canal in China. A. D. 1345 (Yule's *Cathay*, II, 499.) He seems to allude to some particular kind or form of ship which used to be thus fitted with fire-throwing apparatus. (The passage is one of those omitted in Lee's abridgment translation of Ibn Baṭūṭa.)

† Pp. 170, 172, 174.

‡ Travels into Bokhara, I, 67.

§ Extracts from the Emperor Leo's *Tactica* given by Lalanne (*Feu Grégeois*, p. 21). From Leo's description it would appear that the tubes themselves, when filled with the fire composition, were to be thrown in the face of the enemy.

|| *Lexicon Arabico-latinum*, نَافَا and نَافَا, p. 2425.



combustible had come to be used in it in place of naphtha.\* Beckmann, in his "History of Inventions and Discoveries," quotes an account of the Greek Fire at the capture of Thessalonica by the Saracens in A. D. 904, which says that it was blown into the wooden works of the besieged by means of tubes.† A number of passages mentioning this use of tubes for discharging Greek Fire, in the same century and after, are given by M. Lalanne in his *Recherches sur le Feu Grégeois*.‡ And he surmises that certain tubes which Chateaubriand mentions having seen in a collection of old arms shown to him at Jerusalem, may have been specimens of the implements used for Greek Fire.§ But the idea seems to be of much older date than any of the middle age instances referred to.||

There is nothing to show or suggest that in any of the instances in which tubes were used for Greek Fire, the combustible matter they contained was employed to furnish the motive force, or otherwise than as the material for the fire to be thrown. It is certain that this fire material was frequently or generally liquid, and that this liquid was naphtha or petroleum. It appears also that other inflammable ingredients were sometimes added; and that frequently the dry materials, including one or more of the ingredients of gunpowder, were used alone.

Of reports or noises accompanying fire missiles, which have induced the supposition that something of the nature of cannon was used, or shells exploding by means of gunpowder, the most familiar illustration in India is that given in the account by Firishtah of Mahmúd's battle with Anandpál near Pasháwar, in A. D. 1008, when the elephant on which the Hindu prince rode was alarmed by the sudden noise and fled. The notice of this passage in Firishtah gave occasion to the interesting Note by Sir Henry Elliot, in the original first volume of his "Index to the Muhammadan His-

\* As we continue to call a thing a *chandelier* when the lights it carries are no longer candles; and a *volume*, when it has ceased to be a *volumen*, &c., &c. The very word *tormentum*, which Golius here uses, is another illustration.

† *Hist. of Inv. and Disc.*, II, 249. The quotation is from *Leo Allatius*, cir. 1650.

‡ In the times of the Emperor Leo, about A. D. 900; of Const. Porphy., A. D. 950; Alexius, A. D. 1100, &c., *περὶ τοῦ ὕγρου πυρὸς τοῦ διὰ τῶν σιφώνων ἐκφερομένου*, &c., &c., pp. 17, 24, &c. Lalanne quotes also a Russian Chronicle of the tenth century, which speaks of "une espèce de feu ailé" which was discharged "au moyen d'un certain tuyau," p. 29.

§ *Lalanne*, p. 59. "Je remarquai encore des tubes de fer de la longueur et de la grosseur d'un canon de fusil, dont j'ignore l'usage." *Chat., Itinéraire*, II, 313.

|| Casaubon, in his Notes on *Æneas Poliorceticus*, after noticing various ancient fire missiles, says "Observo etiam, ad liquida injicienda, quæ Philo appellat ὕγρὰ τεθερμασμένα, prælongis interdum usos fistulis, quas idem nominat ἐνετήρας." This Philo wrote in the third century B. C.



torians of India," on the early use of gunpowder in India.\* General Briggs had observed, in his translation of *Firishtah*, that in some manuscripts the words *tóp* (cannon) and *tufang* (musket) have been written, in place of the *naft* (naphtha) and *khadang* (arrow) of other copies. A confirmation of the reading *tóp* and *tufang*, Sir H. Elliot says, is given by Wilken, who found this in two copies he had consulted, in which the roar of the cannon also is mentioned. "He considers it not improbable that Greek Fire was used by Mahmúd. Dow boldly translates the word as *guns*."† Sir H. Elliot observes, with reference to *Firishtah*'s account generally, that it does not appear on what authority he rests his statement, as the earlier historians who notice this important engagement do not mention either *naft* or *tóp*.‡ But he adds that from the mention of the use of naphtha ten years later, in an action near Multán, and from the circumstance of naphtha being found in abundance in the country near the scene of the first engagement in question, it is probable that if any combustibles were used on that occasion, they were composed of naphtha. The fact that the fire missile alarmed the elephant, would give no indication that it was of any remarkable or unusual kind. And the noise (*çadâ*) is mentioned in those versions of *Firishtah* which speak of naphtha and arrows, as well as in those which use the words *tóp* and *tufang*.§ It seems to have proceeded from the missile itself, not from the discharge of it. There need not be difficulty in supposing that the noise was of the nature of an explosion, if naphtha alone was used, or naphtha with other combustibles, thrown in shells, cases, or tubes, as elsewhere.

\* P. 340.

† The ordinary form of the passage in *Firishtah* is—

ناگاہ فیلے کہ اندیال برو سوار بود از صدای نفت و خدنگ سراسیمہ گشته روی  
بگریز نهاد \*

Dow's version is—"On a sudden the elephant upon which the prince of Lahore, who commanded the Indians in chief, rode, took fright at the report of a gun, and turned his face to flight." And he says in a foot-note, "According to our accounts there were no guns at this time, but many eastern authors mention them, ascribing the invention to one Lockman." (Dow's *History of Hindostan*, I, 46.) He gives no references to any of these eastern authors.

‡ It may be noticed, however, that the *Kitáb-i-Yamíní*, one of the histories referred to by Sir H. Elliot in this passage, speaks in another place (not relating to this engagement) of the use of *átash-didâh bân*, or fire-eyed rockets, which, an English translator remarks, "may have encouraged the idea that artillery was known in Mahmúd's age." (*Kitáb-i-Yamíní*, translated by the Rev. J. Reynolds, page 279.)

§ Maurice, writing of this battle, says, "A species of fire weapon seems to have been in use at that time in Asiatick battles; and the sudden explosion of one of those instruments of destruction, close by the elephant on which the prince of Lahore, the generalissimo of the army, rode, &c., &c." Which seems to be Dow repeated, with a slight variation, and evading his "bold" use of the word *gun*. (*Modern History of Hindostan*, I, 253.) Dow's translation was recent at the time Maurice's book was written.



Numerous modern petroleum explosions\* have made us familiar with the reports it is capable of producing. Such big demonstrations, of course, can hardly be taken to illustrate what happens with a naphtha shell, but those who have had an opportunity of seeing and hearing a Kerosine lamp explode in their room can understand what it means. The naphtha vapour, like other gases of the same class, when combined with atmospheric air, explodes with a report which, even on a moderate scale, is sufficient, with fiery accompaniment, to alarm an elephant. Explosions are produced, as illustrated by frequent experiences, when the gas, issuing from the ground, or accumulating over the petroleum in wells, is suddenly ignited.† The use of tubes for the discharge of fire missiles, and the accompanying report, might, taken together, easily give occasion, in after times, to the idea that guns and gunpowder were used, though the combustible material was really naphtha or Greek Fire. There is, however, not much to indicate that the noises mentioned were of the nature of what we call a report, and nothing to support the idea that in Mahmúd's time, the beginning of the eleventh century, guns and gunpowder were known.

The use of hollow canes for giving a direction to darts and other missiles is, no doubt, a practice of great antiquity, followed in the present day also by inhabitants of uncivilised islands, and others, and represented among ourselves by our juvenile pea-shooters. In India, bamboos have been used

\* The dangerous nature of which called for the English Petroleum Act of 1862, and the Ordonnance du Préfet de Police (relative à l'emploi des huiles de Pétrole) in July, 1864.

† Thus, for instance, at the great abode of naphtha on the Caspian:—"Outside the temple at Baku is a well. I tasted the water, which is strongly impregnated with naphtha. A pilgrim covered this well over with two or three *nummuds* for five minutes. He then warned every one to go to a distance, and threw in a lighted straw; immediately a large flame issued forth, the noise and appearance of which resembled the explosion of a tumbril." (Captain the Hon. G. Keppel's *Journey from India to England*, II, 221.) The French missionary Imbert, quoted by Huc (*Chinese Empire*, Ch. VII), describes an occurrence of the same kind at the mouth of one of the Chinese *fire-wells*. "As soon as the fire touched the surface of the well, there arose a terrific explosion, and a shock as of an earthquake; and at the same moment the whole surface of the court appeared in flames." "I believe", he says, "that it is a gas or spirit of bitumen." To pass to an illustration on a very small scale, probably many people who have visited the fire temple of *Jwála Mukhí* in the Kángrá District, of the Panjáb, will remember the smart pop with which one of the tiny jets of gas issuing from the rock is re-lighted, when it has been accidentally blown out (as they are sometimes by sparrows flying quickly past them). It is the too well-known property of one of the most familiar of the hydrocarbons, the *grison* or fire-damp, to explode with serious results. "Il brûle tranquillement avec une flamme jaunâtre, tant qu'il n'est pas mêlé avec l'air atmosphérique; mais dans le cas contraire, il détone avec violence". "Quelquefois il se dégage seul, mais souvent il est mélangé de pétrole plus ou moins épais et de bitume." (*Beudant, Minéralogie*, 232).



for this purpose, in very early times, with fire-arrows.\* And in connection with the use of naphtha tubes in war, it is not uninteresting to notice the employment of canes for naphtha and inflammable gas for economic purposes. Humboldt, in his account of the *Ho-tsing* or fire-wells of China,† and of the *rope-boring* for water, salt, and combustible gas, which is practised “from the south-west provinces of Yun-nan, Kuang-si, and Szu-tchuan on the borders of Tibet to the northern province of Shan-si”, says “the gas burns with a reddish flame, and often diffuses a bituminous smell; it is conveyed to a distance, sometimes through pipes of bamboo, sometimes in portable tubes, also of bamboo, to be used in salt works, in warming houses, or in lighting streets.”‡ Also for cooking food, as mentioned in an old account by a Chinese writer,§ and for other purposes.|| Huc, describing these fire wells, says “a little tube of bamboo closes the opening of the well, and conducts the inflammable air to where it is required; it is then kindled with a taper, and burns continuously.”¶ In an old review article in the *Athenæum* mention is made of an account in the *Lettres Edifiantes* of oil

\* Halhed's *Gentoo Laws*. Introduction, p. 50. See also Moor's *Hindu Pantheon*, p. 299, and As. Researches, I, 264.

† *Asie Centrale*, II, 519-540. *Cosmos* (Sabine's transl.), IV, 216.

‡ Here, perhaps, we have the original *νάρθηξ* of Prometheus,

The secret fount of fire

I sought, and found, and in a reed concealed it,  
Whence arts have sprung to men, and life hath drawn  
Rich store of comforts. (*Prom. Vincit.* 107. Prof. Blackie's translation).

Sore ills to man devised the heavenly sire,  
And hid the shining element of fire.  
Prometheus then, benevolent of soul,  
In hollow reed the spark recovering stole.

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The far seen splendour in a hollow reed  
He stole of inexhaustible flame.

(*Hesiod* by Elton. *Ancient Classics for English Readers*, pp. 24-92).

§ “In all parts of this Province (Shan-si) are found fiery wells which very conveniently serve for the boiling of their victuals.” (Description of China, by *Dionysius Kao*, appended to *Ysbrants Ides'* Travels, A. D. 1692, p. 125).

|| “On utilise ces feux naturels pour la cuisson de la chaux, des briques, &c.” Beudant, *Minéralogie*, p. 233.

¶ *Chinese Empire*, Chap. VII. The practice is mentioned also by Sir John Davis. (*The Chinese*, p. 336). And at some of the American oil wells the same method is followed at the present day. “Some of the pumping engines generate steam by the aid of the combustible gas that is so commonly associated with the petroleum, it being only necessary to conduct it by a pipe from the tanks in which the oil accumulates to the furnace of the engine.” (*Prof. H. Draper of New York. Quarterly Journal of Science*, London, 1865, II, 49.)



that rose from the earth, (at places in China) turned in hollow bamboos in any direction, which burned with a clear flame.\* The naphtha gas of Baku is said to be carried about in bottles,† as that of China is in bamboo tubes. It is not improbable that naphtha tubes for hostile purposes may have been suggested by the use of bamboos for the oil and for the gas in the modes above noticed.

Not alone on account of similarity of form, then, but with reference also, it may be supposed, to previous uses of tubes for Greek Fire, and of bamboos for discharging fire arrows, and for carrying petroleum and gas, has the name *canna* been carried forward and applied to modern artillery. The connection of *bomb* and *bombarda* with *bamboo*, however, is not one which illustrates the derivation of the artillery terms from the name of the cane. Βόμβος, *bombus*, a hum or noise, is no doubt the origin of *bomba* and *bombarda*. And *bamboo*, (which is not a name it bears in its own countries) is supposed to be derived from the same origin (viâ *bomba*), and to have been applied to it by the Portuguese, with reference to the noisy explosion of the air chambers of the cane when burning.‡ This is possible, though the experience which occasioned the application of the name must be supposed to have been very exceptional.

For indication of the knowledge of fire-arms in India at a very early period, reference has frequently been made to certain passages in ancient books noticed by Halhed in his *Code of Gentoo Laws*. "It will no doubt," Halhed says,§ "strike the reader with wonder to find a prohibition of fire-arms in records of such unfathomable antiquity, and he will probably from hence renew the suspicion which has long been deemed absurd, that Alexander the Great did absolutely meet with some weapons of that kind in India, as a passage in Quintus Curtius seems to ascertain. Gunpowder has been known in China as well as in Hindostan, far beyond all periods of investigation. The word fire-arms is literally in Sanscrit *Agni-aster*, a weapon of fire; they describe the first species of it to have been a kind of dart or arrow tipt with fire and discharged upon the enemy from a bamboo. Among several extraordinary properties of this weapon one was that after it had taken its flight, it divided into several separate darts or streams of flame, each of which took effect, and which when once kindled could not be extinguished;" (on which Halhed says in a foot note—"It seems exactly to agree with the Feu Grégeois of the Crusades") "but this kind of Agni-aster is now lost. Cannon in the Sanscrit idiom is called Shët-Aghni, or the weapon that kills a hundred men at once, from (shëte) a hundred, and (ghëneh) to kill."

\* Aug. 16, 1862. The reference to the *Lettres Edif.* is not specific.

† Beudant, p. 233.

‡ Elliot, orig. ed., I, 345.

§ Preface, pp. l, li.



The compilation which Halhed published under the above title, *Code of Gentoo Laws*, in 1781, was made from twenty Sanskrit works. It was compiled by eleven Brahmans whom he calls a set of the most experienced lawyers. They were selected, under the orders of Warren Hastings, from all parts of Bengal for the purpose. The compilation, when complete, was translated into Persian, under the supervision of one of these Brahmans, and from the Persian was translated into English by Mr. Halhed. In the compilation itself no indication is given of the particular book (out of the twenty mentioned collectively at the beginning) from which each passage is taken. And in the translator's Preface no references are given to the authorities for his own comments; but he speaks of "the number of enquiries necessary for the elucidation of almost every sentence," which "give him in some measure a right to claim the conviction of the world upon many dubious points, which have long eluded the nicest investigation."\* This is all we get from him. The passage relating to fire-arms is in the second section of the preface to the Code, or "the qualities requisite for a magistrate", and it says "the magistrate shall not make war with any deceitful machine, or with poisoned weapons, or with cannon and guns, or any other kind of fire-arms."† This is clearly from the Institutes of Manu. And what Manu says about it is this, "Let no man engaged in combat smite his foe with sharp weapons concealed in wood, nor with arrows mischievously barbed, nor with poisoned arrows, nor with darts blazing with fire."‡ This appears to be the original passage which in the hands of the Bengal Pandits took the form given by Halhed. And it can be assigned approximately to the ninth century B. C. There is nothing here to indicate anything else than primitive fire darts of the kind used in other countries. Mr. Talboys Wheeler, in a note relating to a description in the Mahábhárata of a variety of arms, says that, in the original, mention is made, among other weapons, of "arrows, producing fire", and he says "The Brahmans in the present day point to the fire-producing arrows as proofs that the ancient Hindus were possessed of fire-arms."§ There are other ancient notices of war missiles or engines which (with more reason than this specific mention of *arrows*) have given occasion to this belief, but there is nothing to indicate what they were. "From the frequent mention of the *Agni-astra*, or fire-arms", Bábu Rájendralála Mitra has observed, "it is to be inferred that the Hindus had some instruments for hurling shells or balls of burning matter against their enemies; but no description of any such has yet been met with."|| The *Maháyantra*, or great engine, and the *Sataghni*, or centicide,

\* Introduction, p. xi.

† P. cxiii.

‡ Institutes of Manu, translated by Sir W. Jones, VII, 90.

§ *History of India*, I, 88.

|| *Antiquities of Orissa*, I, 121.



he refers to as being mentioned in the ancient books but not described. Bohlen\* alludes to the mention in the Puránas of a kind of cannon; but he does not give the name, or any definite reference.

Colonel Tod says, "We have, in the Poems of Chand, frequent indistinct notices of fire-arms, especially the "nal-gola", or *tube-ball*; but whether discharged by percussion or the expansive force of gunpowder is dubious. The poet also repeatedly speaks of "the volcano of the field", giving to understand great guns; but these may be interpolations, though I would not check a full investigation of so curious a subject by raising a doubt."† It can scarcely be questioned now, however, that the doubt was justly raised. The interpolation (if this is the right mode of explaining the passage) has a sort of parallel in a picture, described by M. Lalanne, inserted in 'Le Livre de la Vie et Miracles de Monseigneur S. Loys', in which picture "les sarrasins, d'un côté, se défendent avec des espèces de mousquets à mèche, et, de l'autre, le navire royal porte une rangée de canons."‡

Some kind of fire missile is believed by Prof. H. H. Wilson to be intended in a passage in the *Mahá-nátak* or *Hanumán-nátak*, to which he thus refers in his outline of the play. "In the opening of the thirteenth Act, *Rávana* levels a shaft at *Lakshmana*, given him by *Brahma*, and charged with the fate of one hero: it should seem to be something of the nature of fire-arms, a shell or a rocket, as *Hanumán* snatches it away, after it has struck *Lakshmana*, before it does mischief. *Rávana* reproaches *Brahma*, and he sends *Náreda* to procure the dart again, and keep *Hanumán* out of the way."§ There is not much here to show the kind of missile, except that it does *not* seem to have been anything like a shell or rocket. The play belongs to the tenth or eleventh century. Of the nature of "the Agneya weapon, one of the celestial armoury, or the weapon of fire", mentioned in another Hindu drama, the *Uttara Ráma Charitra*, there is only the indication given in the "fiery blaze" attributed to it; by which, as in the other case, some kind of burning arrow is probably meant.||

While there is no very distinct indication of the nature of the machines or missiles thus referred to in ancient Hindu books, the idea of fire-carrying arrows seems to have been familiar in India, as elsewhere, from early times; and the use of such fire-arrows, discharged from a bow or by other means, is seen to range over a long period. In the *Ayodhyá Máhátmya*, of which a translation has lately been published in the Journal of the Asiatic Society of Bengal,¶ it is related that on a certain occasion the Rájá *Kúsha*, getting

\* *Das Alte Indien*, II, 63, 64.

† *Annals of Rajasthan*, I, 310. Note.

‡ *Recherches sur le Feu Grégeois*, 55.

§ *Hindu Theatre*, Vol. III. Appendix, 58.

|| Id., Vol. II, *Uttar. Ram. Char.* 92.

¶ J. A. S. B., Part I. 1875, pp. 137, 138.



enraged, “put an arrow of fire on his bow, to dry up the water of the Sarayú.”\* The notice in *Manu* appears to be the earliest. And nearly two thousand years after his time, arrows of this kind were in use in Kashmír; towards the end of the century in the beginning of which Mahmúd had been launching naphtha balls against his opponents in the neighbouring plains of the Panjáb. This is M. Troyer’s translation of the passage in the *Rájá Tarangini* in which they are mentioned. “Quand il ne restait que trois heures du jour, les ennemis, encore une fois ralliés, exaspérés par la défaite, marchèrent pour combattre Kandarpa. Alors il lança dans le conflit des flèches de fer, lesquelles étaient ointes d’huile d’herbes, et mettaient en feu les espaces qu’elles traversaient.”† This Kandarpa was the minister of two kings of Kashmír, Utkarcha, who had a short reign in A. D. 1090, according to M. Troyer’s chronology,‡ and Harcha, who came to the throne the same year and reigned twelve years.

Besides the specific notices of arrows, and more indefinite references to the undescribed weapons called by the names abovementioned, there are other passages in the ancient Hindu books relating to the use of combustibles in war. “In the *Udyoga Parva* of the Mahábhárata”, Rájendralála Mitra writes, “Yudhisthira is described as collecting large quantities of rosin, tow, and other inflammable articles for his great fratricidal war; but nothing is there said of any engine with which they could be hurled against his enemies.”§ Another part of the Mahábhárata mentions the use of igneous appliances in aid of defensive arrangements, and here also without any indication of the way in which they were used. It is in connection with the account of the *Aswamedha* or horse sacrifice. The horse had entered the country of *Manipura*, and approached the city of *Babhru-vahana*. “On the outside of the city were a number of waggons bound together with chains, and in them were placed fireworks and fire-weapons, and men were always stationed there to keep guard.”||

\* This *Máhátmya* is ascribed to *Ikshvaku*, son of *Manu* and king of *Ayodhyá*, (*Muir’s Sanscrit Texts*, I, 115).

† Troyer’s *Rádja Tarangini*, Ch. XII, 983, 984.

Was any such simple application of inflammable matter to pointed weapons ever practised in Britain? “Go, thou first of my bards, says Oscar, take the spear of Fin-gal. Fix a flame on its point. Shake it to the winds of heaven.” (*Ossian, The war of Caros.*) Whether this fire at the spear’s point (which must be meant for a signal in this instance) may be meant to indicate also a familiarity with its application to other uses, is doubtful.

‡ Prof. H. H. Wilson assigns dates 23 years later. (Preface to *Ratnavali*, Hindu Theatre, Vol. III.)

§ *Antiquities of Orissa*, I, 121.

|| *Talboys Wheeler, History of India*, I, 405.



Mr. Fergusson has observed, with reference to siege scenes represented in the sculptures of one of the Sanchi gateways (supposed to have been erected about the beginning of the Christian era), that no engines of war are shown, or indications of any attempt to set fire to the place. "In these respects", he says, "the Hindus seem to have been very much behind the stage we know from the Nineveh sculptures that the Assyrians reached at a much earlier age."\* And Bábu Rájendralála Mitra, who makes reference, in the work before quoted, to the siege scenes in the Sanchi bas-reliefs, and to the absence of any indication of engines for casting fire to a distance, or for battering, adds that the martial processions and battle scenes at Bhuvaneswara are also devoid of such representations.† These, however, are only pieces of negative evidence, and do not, by themselves, go far. There are European mediæval pictures of siege operations in which no engines of war are represented, or indications of the use of fire, but only such means of attack and defence as are shown in these Indian sculptures.‡ It may be, and it seems probable, that the Hindus were behind Western nations in the knowledge of the mechanical appliances for such purposes, (as the Chinese were, so late as the thirteenth century of our era§) but they did use fire, and the accounts in books give us what the sculptures omit. Yet we may conclude that nothing more advanced in the way of fire weapons was known in India in ancient times, than was in use in other countries;|| and that the application to these old Indian weapons, of terms belonging to weapons of our own time, is an illustration of the inadvertent (or at least in some way erroneous) transference of familiar ideas to times and places to which they do not belong. Shakspeare brings in cannon in the time of King John.

The prohibition in Manu is probably the earliest notice on record of fire arrows, unless, as has been supposed, they are referred to in Psalm

\* *Tree and Serpent Worship*, p. 141.

† *Antiquities of Orissa*, I. 121.

‡ Wilkinson says, "We may suppose" that the Ancient Egyptians used fire missiles in sieges (I, 363), but there is nothing in the pictures or sculptures to countenance this supposition, and he mentions nothing in support of it.

§ See Yule's *Marco Polo*, 2nd Ed., II, 152. The accounts of the employment of the Polos in the construction of the engines to aid Kublai in the siege of Siangyang are confused; but it appears at all events that Western engineers were employed, and from some accounts, that they were specially sent for. Not that the Chinese and their enemies were altogether unacquainted with war machines, but the people of the West were ahead of them.

|| Nothing of much value is obtained from the statement in the *Dionysiaca* of Nonnus that the followers of Bacchus, in his invasion of India and battle with Deriades, fought with brands and bolts of fire. (*As. Res.*, XVII, 617.) The question whether the materials for the Indian part of the poem were derived from an Indian source is discussed in the paper here referred to, by Prof. H. H. Wilson.



lxxvi. 3. "The arrows of the bow" might be translated "the glowing fires", or "the glittering or flashing (arrows) of the bow", "or rather perhaps", says Parkhurst, "the βέλη πεπυρωμένα, fiery or fire-bearing arrows, such as it is certain were used in after times. So Montanus, *jacula ignita*."\* The Psalm belongs to the century before Manu, or a little more than ten centuries B. C., if the Asaph with whose name it is connected was the contemporary of David. And to a time about three centuries later, the end of the eighth century B. C., if he was Asaph, "the recorder" of King Hezekiah's time. But it seems most probable, notwithstanding Parkhurst's suggestion, that in this instance no reference to fire arrows is intended. Though the literal rendering may be as above, it may be only a poetical figure of a not uncommon kind.† A more probable reference to fire-bearing

\* Parkhurst, Heb. Lex. s. v. *הַשֵּׁר*, the meanings of which, as a noun he gives as "red hot coal", "glowing fire", "flashes of lightning". Gesenius translates it *flame*, and refers to its use in Psalm lxxviii. 48. The same word in Arabic, *رشق*, *rishq*, is interpreted by Golius, "Jactus rapidior vel vibramen teli. Certus jaculandi seu petendi modus." The LXX render the words referred to, in Ps. lxxvi. 3, τὰ κράτη τῶν τόξων, followed by the Vulgate, *potentias arcuum*.

† Thus in other Psalms we have, by a sort of reverse simile, *arrows* used for *lightning* (Ps. xviii. 14; cxliv. 6. Also Hab. iii. 11; Zech. ix. 14). In the *Tārīkh i Yamīnī*, "arrows ascending towards them like flaming sparks of fire." (*Dowson's Elliot*, II, 34.) The idea of flame or lightning is attached to bright and quick-moving weapons of various kinds. Thus in Nahum iii. 3. A similar figure probably is intended in Gen. iii. 24, so also Virgil's

vaginâque eripit ensem

Fulmineum ——— (Æn. IV. 580).

"The sword is in your hands. Let Jessulmer be illumined by its blows upon the foe." (*Tod's Rajasthan*, II, 251). The epithet *blazing* is mentioned by Rājendralāla Mitra as applied in a passage of the *Rig Veda* (IV, 93) to swords, lances, and other weapons. (*Antiquities of Orissa*, I, 119.) Khwāndmīr, in a description of a battle, speaks of the "flame-exciting spears." (*Habīb us-siyar*. *Dowson's Elliot*, IV, 172). And 'Unsurī of Balkh, in one of his odes, "Hadst thou seen his spears gleaming like tongues of flame through black smoke, &c." (*Elliot*, IV, 516). And Homer Il. X, 153, thus rendered by Chapman, in prosaic fashion telling us it was a reflection—

His spear fixed by him as he slept, the great end in the ground,  
The point that bristled the dark earth cast a reflection round,  
Like pallid lightnings thrown from Jove ———.

Pope, more happily,

Far flashed their brazen points

Like Jove's own lightning.

"In that arrow the terrible god hurled forth the fire of wrath, &c." (*Mahādeva's Equipment for Battle*, *Muir's Sanscrit Texts*, IV, 225.) This too is probably figurative fire, though it is added that he discharged it against the castle of the Asuras, and the Asuras were burnt up, p. 226.

Krishna and Arjun are sent by Mahādeva to a lake where he had deposited his bow and arrows. They see two serpents, one vomiting flames. The serpents change their form and become bow and arrows, p. 186.



arrows is in Psalm cxx. 4. The word there used "coals of juniper" (more properly *broom*) seems to refer to actual burning matter.

Between the ancient Hindu writings which mention fire-arrows in early days in India, and the Muhammadan historians who tell of naphtha-throwing, in the time of the first Arab invasions of Sind, we get some indications, from a different source, of the use for similar purposes of the petroleum of the north-west districts of the Panjáb, about fourteen hundred years before it was used in Mahmúd's battles in that quarter. The oil mentioned by Ctesias as used in the attack of cities, which was launched against the gates in earthen vessels, and set fire to everything around, with a flame which could not be extinguished by any ordinary means, is obviously petroleum, though his story is that it was obtained from a large animal found in the Indus. And the animal described, though called a worm (*σκώληξ*), is as obviously (in spite of errors and exaggerations with regard to it as well as to the oil) a crocodile.\* It was seven cubits in length, and had a skin two fingers thick, and remarkable teeth. It used to come up on the land at night, seize any animals it could find, and drag them into the water to satisfy its hunger.† Philostratus repeats the story, noticing also, as Ctesias does, that the oil was prepared only for the king.‡ He transfers the animal to the Hyphasis; but from the nature of the materials for his work some inaccuracies may be expected. The story is essentially the same and is probably taken from Ctesias. It is not difficult to see in these accounts a confusion of separate facts. The petroleum obtained in the districts on both sides of the Indus below Atak is for the most part gathered from the surface of water. Ctesias refers in another passage to the oil which floats on certain lakes or ponds in India, and springs discharging oil.§ Again, the highly inflammable mineral oils and other products of the same class have been very generally believed to be of animal origin.|| In discussing

\* That it should be called a worm, is perhaps not very surprising. Long after that time, people did not know exactly what kind of animal it ought to be reckoned. Thomas Herbert, (A. D. 1638) writing of the "hatefull crocodile" of Sumatra, calls it "this detested beast, fish, or serpent, by seamen improperly cald Alligator." (*Some Yeares Travels*, p. 323.)

† *Ctesiae Ind. Historiæ Excerptæ*, Gronovius, p. 664.

‡ *Vit. Apollon. Tyan. III*, 1. The petroleum collected from a spring in the south of Persia, we are told by Dr. Fryer, who travelled in that country in 1674, used to be carefully guarded, and taken for the king's use only. (*Nine Years' Travels*. J. Fryer, M. D. Cant., p. 318.) The story of its discovery, on one of king Farídún's hunting parties, and of its being reserved for the king's use, is given in Honigberger's *Thirty-five years in the East*, s. v. *Asphaltum Persicum*, p. 238. Also in the *Makhzan i Adwiyah* by Muhammad Husain of Dihlí, A. H. 1180.

§ *Ctes. by Gronov.*, 666.

|| Modern researches on the nature of some of the great deposits of petroleum in the United States and Canada, and elsewhere, have led to the conclusion that they are



the apparent description by Ctesias of the crocodile, and with reference to the question whether oil is obtained from that animal, Sir Henry Elliot, in the note before referred to, mentions the result of an investigation on the subject in which Prof. H. H. Wilson took part. But there is no mistake about Crocodile oil. Not only, as Sir H. Elliot observed, is it mentioned in native works on *Materia Medica*, but at the present day it is one of the recognised commercial products of this country, and will be found duly recorded No. 8282 in Dr. Forbes Watson's comprehensive list, prepared in connection with the scheme for an Industrial Survey of India. If we accept the crocodile, the story takes a tolerably compact form and admits of easy and plausible explanation. Here was an inflammable oil, of remarkable properties, believed to be of animal origin, and obtained from the surface of waters on both sides of the Indus. Here was a big water animal, of frightsome appearance and character, residing in the Indus, and from which oil was obtained. It is a very natural supposition that Ctesias, having some version of these facts before him, put this and that together, and like Mr. Pickwick's friend who wrote on Chinese Metaphysics, "combined his information."\*

in great part the product of animal decomposition. (*Prof. Archer, in Art Journal of August, 1864. Prof. Draper of New York, in Quarterly Journal of Science, (London) Vol. II, 1865, p. 49. Prof. Ansted, Qu. Journal of Science, II. 755*). The substances of this class which, according to popular belief, are most directly of animal origin, are *ambergris*, and the dark bitumen known as *mūmiāḥ*, highly esteemed in India and Persia as a medicine. With regard to *ambergris*, believed to be a kind of petroleum issuing from rocks and hardened in the sea, modern opinion is coming round to the belief that whether or not it comes into the sea in this way, and is then swallowed by the monsters of the deep, it is actually obtained from the whale. (*Bennett's Whaling Voyage round the Globe, quoted in Yule's Marco Polo, II, 400. The animal is the Physater macrocephalus, according to Linnæus (Gmelin, XIV, 495). See also Sindbad's Fifth Voyage, Lane's Thousand and One Nights, III, 66, and note, p. 108. Le Gentil, Voyages dans les Mers de l'Inde, II, 84. D'Herbelot, Bibl. Or., s. v. Ghiavambar. Al-Mas'ūdī, Meadows of Gold, ch. XVI. Renandot's Ancient Accounts of India and China by two Muhammadan Travellers, p. 94. The precious mūmiāḥ is understood a little more exactly. But at the present day it is popularly believed to be obtained from land animals (sotto voce human) by a process exactly similar to that described by Ctesias for extracting from the big beast of the waters the inflammable oil used in sieges in India. (See Vigne's Ghuzni, p. 61,—"the asphaltum so well known in India by the name of negro's fat".) Two years ago there was much alarm among the native servants and others at some of our hill stations in the Panjāb, occasioned by a rumour that a demon who practised the horrible manufacture was prowling about nightly, seizing unwary and unprotected people, to furnish material for the preparation of the first-class mūmiāḥ.*

\* It is only by a poetical coincidence, and not with any reference to the combustible product supposed to be obtained from it, that the crocodile itself is described in the book of Job as breathing fire. "Out of his mouth go burning lamps [or blazing torches,



The account given by Philostratus of the defence of forts in India by thunderings and lightnings which the defenders had power to discharge on their assailants,\* refers, no doubt,—if any real thing is referred to,—to some description of petroleum missile or Greek Fire. But it is most likely only a reference to the mythical celestial weapons and command over the elements.† Whenever petroleum or naphtha was obtained, its use for hostile purposes has been appreciated, and the forms of its application have been various. One of the devices of Iskandar Zul-Karnain, in preparing for encounters with the Hindus, as related by Mír Khwánd‡ was to make a number of hollow images in the form of soldiers, filled with dry wood and naphtha, to be set fire to in the midst of the battle. The great junks of the Chinese in the middle ages carried arms and naphtha to defend themselves against the pirates of India.§ The material used for fire-missiles in China in the beginning of the tenth century was known by the name of the “oil of the cruel fire.”|| A recent investigator on the subject of Chinese oils states that the petroleum of Shansi, Lechuen, and Formosa, is said to have been formerly employed by the Chinese in Greek Fire compositions.¶ For use in fire-rafts for destroying other vessels and wooden structures, petroleum is of course very suitable, and has been frequently so used.\*\* And thrown upon ships from a distance, or directly applied in other ways, it well serves the same purpose.†† Bituminous fire shells are noticed by Tasso as used in the First Crusade (A. D. 1099).‡‡ In a descriptive Catalogue of

as in a translation published in the Calcutta Christian Intelligencer, Feb. 1862] and sparks of fire leap out. Out of his nostrils goeth smoke, as out of a seething pot or caldron. His breath kindleth coals, and a flame goeth out of his mouth.” Ch. xli. 19-21.

\* *Vit. Apollon. Tyan. II, 14.*

† See *Uttara Rāma Charitra* (in Wilson’s Hindu Theatre), pp. 14, 92, 96, &c.

‡ *Rauzat-uş-şafá, Shea’s translation*, p. 400.

§ *Reinaud, Mémoires sur l’Inde*, p. 300.

|| *Grose’s Military Antiquities, II, 309.*

¶ *Dr. F. Porter Smith, on the oils of Chinese Pharmacy and Commerce. Journal of the Pharm. Soc. 1874.* (The reference is taken from a newspaper review.)

\*\* *Lalanne, Feu Grégeois*, p. 45, &c., &c.

†† “At Dely there is a fountain of oil which is said to be unextinguishable when once it is set on fire; and with which the king of Achen burnt two Portuguese Galleons near Malacca about 8 or 10 years ago.” *M. Beaulieu’s Voyage to the East Indies*, A. D. 1619 (in *Harris’s Collection*, p. 250). The irresistible rapidity with which timber touched with petroleum is consumed by fire is illustrated in the recent destruction of the *Goliath* training ship.

‡‡ *Jer. Del. XII, 42* (Fairfax’s version)

Two balls he gave them, made of hollow brass,  
Wherein enclosed, fire, pitch, and brimstone was.  
misses the *bitumi* of the original.



Arabic Military books,\* mention is made of a peculiar mode of carrying fire into a fight, on the face of shields furnished with large hollow bosses which were filled with naphtha and had matches applied at one or more little apertures. The device seems rather stupid and impractical, but these shields are said to have been used in the battle before Mecca, at the attack on that place by Hajjáj-bin-Yúsuf, before referred to, in A. H. 73 (A. D. 692.) Another form of combination of offensive with defensive arms has been devised in more modern times, which is not much better. The Yárkandís, as we learn from Sir D. Forsyth's account of his embassy, have "large circular shields gaudily painted with dragons and other hideous monsters on one side, and concealing, on the other, a gun-barrel set in a socket of wood, and serving also as a handle whereby to carry the shield."†

It has been a question whether the *scorpions*, often mentioned as offensive missiles, are to be taken in their literal meaning, or as representing some kind of actively inflammable preparation, called by this name on account of the sharp style of its attack and painful nature of its effects; just as some of the engines used in war bear the names of familiar animals with reference either to their form and appearance or to their mode of application.‡ One of these engines was called a scorpion.§ This question has been discussed by Sir Henry Elliot in the volume before referred to,|| in connection with the account in the *Tárikh-i-Alfi* of the capture of the city of Násibín, in the time of the Khalífah 'Omar, in the seventh year after the death of Muhammad, when large black scorpions are said to have been made use of in the attack. In support of the supposition that "a combustible composition formed of some bituminous substances" may have been meant, he observes that the ancient Indian weapon or rocket called *satagni*, the hundred-slayer, also signifies a scorpion. And the fireworks mentioned in the book translated by Casiri, which gives occasion to Hallam's query about the *pulvis nitratus*, are described as being "in the form of scorpions". But though the name has been applied to fireworks and fire missiles as well as to a mechanical engine of war, yet seeing the distinct mention of these animals in many instances, (and of other offensive animal missiles thrown into besieged places) there need be no difficulty in accepting the literal interpretation. If the situation of the city of Nisibis (with reference to the capture of which place with the aid of scorpions the matter has been

\* *Fihrist al-kutub fi 'ilm il-harb*, p. 64.

† *Report of a Mission to Yarkand*, in 1873, p. 13.

‡ Testudo, Musculus, Aries, Onager, Scorpio, Chat, Sow, &c., and, ironically, the *Bride* ('arús), as tender an instrument, in its way, as the *maiden* in our own country.

§ Said to have been invented by the Cretans. *Plin. N. H.*, VII, 57.

|| *Bibl. Index to the Moh. Hist. of India*, Calcutta, 1849, 146, 163. Dowson's Edition, V, 152, 550.



discussed) in a country supplying bituminous material, which actually was used for fire missiles in that neighbourhood, favours the former idea, at the same time it is a place noted for real scorpions, in modern as well as ancient days.\*

Among the preparations for the great war on the plain of *Kurukshetra*, it is related that Duryodhana, having fortified his trench with towers, supplied the defenders of the towers with "pots full of snakes and scorpions, and pans of burning sand and boiling oil."† And there are numerous instances since that time of the similar use of the living animals.‡ The Emperor Leo gives instructions, in his *Tactica*, for this employment in war of serpents and scorpions.§ Larger creatures, dead and living, less directly hurtful but unpleasant, have often been thrown into besieged places for the annoyance of the defenders. Human beings have occasionally been projected in this way from the military machines;|| and it is related that on a certain occasion an unlucky engineer was accidentally hurled into a fortress by one of his own great engines.¶

The introduction of improved devices for war missiles, and particularly of gunpowder artillery, was, from various causes, slower in some countries than in others. Some nations from their position and opportunities, or by

\* *Rev. J. P. Fletcher, Notes from Nineveh, I, 164.* The work published under the name of Ibn Haukal also mentions both serpents and scorpions in the neighbourhood of Nisibis; (*Ouseley's Geography of Ibn Haukal, 56*) and, it may be observed, also mentions another place noted both for naphtha springs and for a species of scorpion more destructive than serpents (p. 77).

† *History of India. J. Talboys Wheeler, I, 275.*

‡ Imperavit quam plurimas venenatas serpentes vivas colligi, easque in vasa fictilia conjici. \* \* Pergamenae naves quum adversarios premerent acrius, repente in eas vasa fictilia, de quibus supra mentionem fecimus, conjici coepta sunt. (*Corn. Nep. Hannibal, X. XI.*) Frontinus notices this incident among his devices of war, but seems to make a mistaken reference to the occasion. "Hannibal regi Antiocho monstravit ut in hostium classem vascula jacularentur viperis plena, quarum metu &c." (*Frontini Stratagemata IV, 10*). Other instances in the East. "And Khalaf cast at them pots full of serpents and scorpions from slinging machines." (*Kitab-i-Yamini, Memoir of Sabaktagin. Reynold's Transl., 54*). "Et praeterea habebant et ignem Graecum abundanter in phialis et ducentos serpentes perniciosissimos." (*Itinerarium Regis Richardi, XI, 42, quoted by Lalanne, p. 44.*

§ *Lalanne, Feu Grégeois, p. 27.*

|| *Yule's Marco Polo, II, 124.* Ibn Batuta relates an occurrence of this kind at Dihli in 1325. (*Travels of Ibn Batuta, by Lee, 145.*)

¶ A modern artist has improved upon this by a voluntary performance of the same kind, according to a story which has appeared in recent English newspapers (Dec. 1875). The story is that a Parisian acrobat gets himself flung up to the high trapeze by being shot from a mortar; and that, on a late occasion, an overcharge of powder, or some other small error in the adjustments, sent him a little further than he intended, and landed him in the front row of the spectators.



reason of their aims and requirements, have been more receptive than others of such improvements in military matters. And some, pursuing careers of conquest or of enterprise, have been the chief means of communicating the knowledge of these improvements and inventions, which they themselves had acquired and brought into use. The Arabs early used the resources of the countries in their possession for the preparation of fire compositions for use in war, and, among others, (as we have seen) of gunpowder applied to fireworks; but their knowledge of the application of gunpowder to artillery there is every reason to believe was derived from Europe. Their active and extensive inroads into other countries, East and West, were long anterior to the days of gunpowder artillery.\* The Spaniards, Prescott says, deriving the knowledge of artillery from the Arabs, had become familiar with it before the other nations of Christendom.† This is perhaps not well established. But the Spaniards and Portuguese, whether or not the knowledge was thus received and thus familiar, were the means of conveying it to eastern and other countries with which they traded and fought, or in which they settled; and sometimes they found themselves forestalled. If some people were specially apt in adopting the new weapon, in other countries there were hindrances of different kinds in the way of its introduction or general use. Sometimes of course the reason for artillery not being used was that it was not wanted. Then the cannon in early days were very cumbersome and very troublesome. The first field-pieces were so clumsy and so difficult to manage, that (as Prescott mentions) Machiavelli, in his *Arte della Guerra*, recommends dispensing with artillery.‡ Hume believes the French had cannon at the time Creci was fought, but left them behind as an encumbrance. It is not surprising, then, that some Asiatic nations, and others, were slow, as we find, in bringing gunpowder artillery into use. Few of those who had the means, failed, it may well be believed, to adopt this new instrument of war from under-rating its power and importance.‡

\* "What an exalted idea must we not form of the energy and rapidity of such conquests when we find the arms of Islam at once on the Ganges and the Ebro, and two regal dynasties simultaneously cut off, that of Roderic, the last of the Goths, of Andaloos, and Dahir Despati in the valley of the Indus." (A.H. 99., A.D. 718). *Tod's Annals of Rajasthan*, I, 243.

† *Ferdinand and Isabella*, I, 277.

‡ And more probably from the feeling that they were happier days when it was not known: as good George Herbert sings,—

Deerat adhuc vitiis nostris dignissima mundo  
Machina, quam nullum satis execrabitur ævum.

\* \* \* \*

Exoritur tubus, atque instar Cyclopiæ Homeri  
Luscum prodigium, medioque foramine gaudens!

\* \* \* \*



The number of guns that could be brought into use was for a long time very moderate, and they therefore did not at once supersede the previous contrivances. The English were among the first, after the properties of gunpowder had become known, to employ big guns. It was in the early part of the fourteenth century that this mode of applying gunpowder was first practised in Europe; and from that time it slowly advanced.\* The *Ballistarius*, once an important official in our English fortresses, made way, perhaps more rapidly in Britain than elsewhere, but not all at once, for the *Master Gunner*. In the East, the *Naft-andáz*, or naphtha-thrower, was the co-adjutor of the *Manjaníkí* who worked the engines; and these have in due course been succeeded by the familiar *Gol-andáz* of the Indian native armies.†

Guns were brought into the field by the English at Creci in 1346. It is said by Tytler and others that Froissart makes no mention of the guns

Accedit pyrius pulvis—&c., &c.

\* \* \* \*

Dicite vos, Furiae, qua gaudet origine monstrum?

*Inventa Bellica.*

Milton, with the same feeling, ascribes the invention of both cannon and powder to infernal agency. *Par. Lost*, B. VI.

\* Chaucer, in a poem written probably about the end of the third quarter of the fourteenth century,—the transition period of artillery in Britain,—borrows illustrations from both the old and the new descriptions of military engines. It is in a didactic passage in “*The House of Fame*”, in which he discourses on the nature of sound.

Soun is nought but air y-broken  
And every speeche that is spoken,  
Whe’r loud or privy, foule or fair,  
In his substance ne is but air.

After this, in noticing various descriptions of sound, he says,  
And the noise which that I heard,  
For all the world right so it fered,  
As doth the routing of the stone  
That fro the engine is letten gone.

And again,

Throughout every region  
Y-went this foule trompes soun,  
As swift as pellet out of gonne  
When fire is in the powder ronne.\*

† It is by a fine oriental figure of speech, and with no reference, now, to pyrotechnic functions of any kind, that another familiar Indian official, of humble rank, is styled a *Barq-andáz*, or ‘darter of lightning’.

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\* One of the early kinds of cannon “was fired by applying a metal bar made red hot in the furnace to the powder contained in the chamber.” *Viollet le Duc, Mil. Arch. of Mid. Ages*, 172,



at Creci. But a recent reviewer has indicated two manuscripts of Froissart in which they are distinctly mentioned as used by the English on that occasion. And he gives some quotations.\* Froissart had spoken of guns employed at an earlier date,—at the siege of Stirling by the Scots in 1341. Tytler (*Hist. of Scotland, Vol. II.*, p. 60) says this is not corroborated by contemporary historians. But at a still earlier date they had been used in Britain, if, as is generally understood, guns are meant by the *war-crakes* (*crakys of weir*), mentioned by Barbour as having been first seen by the Scots in their skirmishes with Edward III's forces in Northumberland in 1327.†

But long after those days, in Britain and other countries where gunpowder and its modern application were well known, the employment of cannon had not made great progress. In India they were used by Bábar, as largely, it would seem, as the means and skill available would permit; and he was not much behind other countries in this respect. In 1528, when he had the aid of artillery in forcing the passage of the Ganges near Kanauj, he says, "For several days, while the bridge was constructing, Ustád 'Alí Kūlī played his gun remarkably well. The first day he discharged it eight times; the second day sixteen times; and for three or four days he continued firing at the same rate."‡ This was just fifteen years after Flodden, when artillery practice was at much the same stage in Britain.

Their marshall'd lines stretched east and west,  
And fronted north and south,  
And distant salutation pass'd  
From the loud cannon mouth;  
Not in the close successive rattle

\* "Li Englès—descliquierènt aucuns kanons qu'il avoient en le bataille pour esbahir les Genevois."

"Les Englès avoient entre eulx deulx des bonbardieaulx, et en firent deulx ou trois descliquer sur ces Genevois." And from another chronicle (St. Denis) the reviewer quotes, "Lesquels Anglois giettèrent trois canons: dont il advint que les Gènevois arbalestiers qui estoient au premier front tournèrent les dos et laissèrent à traire; si ne scet l'en sé ce fu par traison, mais Dieu le scet." *Saturday Review, July 24th, 1875.* Review of *Edward III.* by Rev. W. Warburton, M. A. The reviewer makes these notes with reference to an observation of the author that Villani is the only historian who mentions the employment of cannon at Creci.

† Tytler, *Hist. of Scotland, IV*, 150. Note. Sir Walter Scott also gives a note in the *Minstrelsy of the Scottish Border* on this mention of guns by Barbour. Some early notices of powder and cannon are referred to by a writer in *Notes and Queries*, May 15th, 1869. The earliest date mentioned is *cir.* 1326.

‡ *Memoirs of Baber, tr. by Leyden and Erskine*, p. 379; *Erskine, Hist. of India under the first two sovereigns of the House of Taimur, Baber, and Humayun*, I. 486. *Dowson's Elliot, IV*, 279.



That breathes the voice of modern battle,  
But slow, and far between.\*

It was not till after many improvements and much further experience, during a long course of years, that things came to be done after this other manner.

The walls grew weak ; and fast and hot  
Against them pour'd the ceaseless shot,  
With unabating fury sent  
From battery to battlement ;  
And thunder-like the pealing din  
Rose from each heated culverin.†

Bábar gives a name to the gun which his engineer and master-gunner, 'Alí Kulí, managed in the way above mentioned :—("the gun which he fired was that called *Deg Ghází*, the victorious gun"—) from which it is seen that he had others, besides one which was put *hors de combat* at an early period in the engagement ("Another gun, longer than this, had been planted, but it burst at the first fire"). But it is not likely that the many other carriages ('*arába*), mentioned in other accounts of his war equipment,‡ mean *guns*, but rather, (as supposed by M. Pavet de Courteille, the latest translation of Bábar's Memoirs, and by Prof. Dowson) carts of some kind, used for transport of ordnance stores and for other purposes in connection with the guns. Leyden (or Erskine) translates the word as *guns*, even when mentioning so large a number as seven hundred. This is out of the question. It appears indeed from other notices of Bábar's artillery that on some occasions, a single piece was all he had, though at other times he had several.§ "About noon-day prayers, a person came from Ustád with notice that the bullet was ready to be discharged, and that he waited for instructions. I sent orders to discharge it, and to have another loaded before I came up."|| A deal of work has often been done with a single gun. But the possession of the new weapon did not confer a very formidable superiority when this was the whole of the artillery.¶

\* Marmion, VI, 23.

In the early days of artillery in Europe "it was usual for a field-piece not to be discharged more than twice in the course of an action." Prescott, *Ferdinand and Isabella*, I, 87.

† Byron, *Siege of Corinth*.

‡ Dowson's *Elliot*, *Tuzak-i-Bábarí*, IV, 268, and Note.

§ James's ordnance, at Flodden, as given by Pitscottie, consisted of "seven cannons that he had forth of the Castle of Edinburgh, which were called the Seven Sisters, casten by Robert Borthwick, the master-gunner, with other small artillery, bullet, powder, and all manner of order, as the master-gunner could devise." *Marmion*, Note 3 D.

|| *Tuzak-i-Bábarí*, Dowson, IV, 285.

¶ Reminding one of Hood's account of the arrangements for quelling an election riot, as supposed to be described in the letter of a country cousin at the scene of action.



India seems to have freely adopted the new instrument of war, while Persia was slow to use it, even after experience of its powers, and even after beginning to make use of it, did not take to it very kindly. The brass ordnance which contented the Indian commanders in Bábar's time, and after, was doubtless of a somewhat rough construction, as we read of Sher Sháh Súr, in 1543, issuing an order to his people to "bring all the brass in camp and make mortars (*degħa*) of it", to bombard the fort of Ráisín; and they brought their "pots, dishes, and pans," and made them into mortars.\* This shows at all events a ready appreciation of the value of artillery. Something more pretentious than these extempore mortars, and more cumbersome, were the guns which, very soon after this, (in 1551) we hear of Islám Sháh (Sultán Salím) taking with him from Dihlí to Láhor, after Mírzá Kám-rán's flight from the court of Humáyún, to take refuge with him. Starting in haste he could not get a sufficient number of oxen in the villages near Dihlí, and "each gun was pulled by 2000 men on foot."†

At this time, and for long after, Persia was not so far advanced. One of the Jesuit missionaries, writing from Ormus in 1549, says of the *Soldanus Babylonicus*, the ruler of the territories adjoining, "qui modo *Catheamas* appellatur", (that is *Sháh Tahmásp*) "Hic bona ex parte Persis imperat, et in Regibus potentissimis jure optimo censetur. Eius robur omne ac vis copiarum equitatu constat, et peritissimis sagittariis. Nullis bombardis nec aliis huius generis tormentis utuntur. Sæpe cum Turcis, et quidem felici Marte belligerant."‡ They were not unacquainted with guns, and had suffered from the Turkish artillery in the time of this king's predecessor, Ismá'il Safí. And Herbert relates that when the Turks under Sulaimán invaded Persia, this same "Tamas, affrighted with their great ordnance, hyres 5000 Portugalls from Ormus and Indya, who brought 20 cannon along with them, and by whose helps the Turks were vanquished."§ The Turks were early noted for their attention to gunpowder artillery, and the armament of their forts seems to have been on a par with that which they brought into the field against the Persians and others. At the time when Father Gaspar wrote the above account of the defect of artillery in Persia, a French traveller and naturalist, M. Bellon, says of the fortifications of Sestos, which he saw in 1548, "Validis tormentis bellicis egregie muniti sunt, quæ explo-dantur (si necesse sit) in eas naves quæ sine licentiâ effugere, vel in Helles-

One passage runs somewhat in this fashion. "3 p. m. Riot increases. The military has been called out. He is at present standing opposite our door!"

\* *Tárikh-i-Sher Sháhí*. Dowson's *Elliot*, IV, 401.

† *Tárikh-i-Dáúdí*. Dowson's *Elliot*, IV, 499. See also notices of artillery at this period in the *Tárikh-i-Rashídí*, V, 131, and *Tárikh-i-Alfí*, V, 172.

‡ *Epistolæ Indicæ*, p. 38 (*Ep. M. Gaspari Belgæ*).

§ *Tho. Herbert. Some Yeares Travels*, p. 289.



pontum vi perrumpere vellent.”\* It was from the Portuguese that Persia had to obtain the assistance of guns. And twenty years before this, the Spaniards were using artillery in Mexico, and cast guns there for themselves.†

When, in the next century, Ormus was taken from the Portuguese by the Persians under Sháh 'Abbás the Great, with English assistance (1627), the armament of the defenders was something considerable, according to Herbert's account of it. “The brass Ordnance in the Castle and Rampires were divided; some say they were three hundred, others as many more: Howbeit, our men say there were only fifty-three great brasse peeces mounted, foure brasse cannon, six brasse demicannon, sixteen cannon pedroes of brasse, and one of iron, 9 culverin of brasse, two demiculverin of brasse, three of iron, ten brasse bases, seven brasse bastels, some basilisks of 22 foot long, and nintie two brasse peeces unmounted; which I the rather name, in that the Portugalls bragge they had small defence, and few Ordnance.”‡ At this time guns, both large and small, were in use in Abyssinia, having been introduced by the Turks and Arabs in occupation of various parts of the east coast of Africa.§ On the west coast of India also, at the same time, some skill in the use of artillery had been acquired by people not otherwise highly advanced. “*Mallabar*”, says Herbert, “is subdivided into many Toparchieyes, all obeying the Samoreen, a naked Negro, but as proud as Lucifer.” “By long warres, they are growne expert and orderly: yea know how to play with Cannons, have as great store of Harquebuzes, and are as well acquainted with the force of powder, as we or any other nation.”|| A special ordnance department was instituted in India in Humáyún's time (when, as we have seen, artillery had come to play an important part),¶ preparing the way for the more complete arrangements under Akbar, who paid much attention to this part of his war equipment, and who was, himself, according to Abul Fazl, an improver and inventor of matters connected with this department.\*\*

Persia continued to be backward in its artillery. In 1635, when Herbert was in that country, Sháh Safí, grandson of 'Abbás the Great, being king, the traveller writes, “In a common muster the Persian king can easily advance (as appears by roll and pension) three hundred thousand

\* *Bellonii Observationes*, 186.

† *Prescott, Conquest of Mexico*, II, 266.

‡ *Herbert's Travels*, p. 118.

§ *Lettera Annua di Ethiopia*, Gasparo Paës, 1624.

|| *Herbert*, 300, 302. This disregard of clothing, by even the king, was in the preceding century (1443) remarked upon by 'Abd-ur-Razzák, author of the *Maṭla' us-sa'dain*, and afterwards by other European travellers, *Dowson's Elliot*, IV, 101, and *Note*.

¶ *Humáyún-námah*. *Dowson's Elliot* V, 123. *Tárikh-i-Rashidi* V, 133.

\*\* *Blochmann's A'in-i-Akbari*, *A'in* 36, I, p. 112.



horse, and seventy thousand good musquetoons." "Their harquebuz is longer than ours, but thinner and not so good for service. They can use that very well, but detest the trouble of the Cannon, and such field peeces as require carriage."\* When Kaempfer was in Persia more than fifty years after (in 1692), they seem to have got no further. "Arma illis sunt lancea, sclopetum, arcus, et acinaces; tormentorum et mortariorum nullus illis in campo usus est."† India was much ahead, as we learn from Bernier's account of Aurangzib's artillery thirty years before this time.‡

After seeing the kind of progress that was being made in India and Persia in the sixteenth and seventeenth centuries, one may be surprised to read, in the papers on the History of the Burma race, compiled by Sir A. Phayre from native sources, published in the J. A. S. B., that in the beginning of the fifteenth century, more than a hundred years before Bábar appeared with his guns on the bank of the Ganges, the king of Pegu, advancing up the Iráwadi against king Meng Khoung, did not dare to land and attack Prome, "as it was defended with cannons and muskets."§ The editor of the Journal has observed that this mention of guns and muskets in Burma in 1404 is rather remarkable. It is, if they were what we understand by cannons and muskets. But it suggests a question. This was a region abounding in petroleum. Is it not possible that these fire-arms may be explained in the same way as Mahmúd's *tóp* and *tufang*? (above, page 41). It is true that a traveller who was in India about that time (Nicolo Conti) says "the natives of central India" (by which he seems to mean a part he had not visited) "make use of balistae and those machines which we call

\* P. 232. The objection to field guns is one that can be readily understood, from the similar experience of other countries, above referred to. Of a different kind was the dislike which a traveller in the previous century says the people of North Africa had to the smaller fire-arms. "All the Arabians that live towards the west, where the kingdoms of Fez and Morocco lie, do commonly carry spears about twenty-five hands long. They use no Musquets or Pistols, neither do they love 'em." (*Description of Africa. From John Leo and Marmol. Harris's Collection, I, 311.*) Tod says the same of the Ráj-púts of the same and later times. Writing of A. D. 1535 he says, "The use of artillery was now becoming general, and the Moslems soon perceived the necessity of foot for their protection; but prejudice operated longer upon the Rajpoot, who still curses "those vile guns" which render of comparatively little value the lance of many a gallant soldier." (*Rajasthan I, 310.*) See a parallel to this idea cited by Colonel Yule, *Marco Polo, II, 127.*

† *Amœnitates Exoticæ, 75.*

‡ Cinquante ou soixante petites pièces de campagne, toutes de bronze; soixante et dix pièces de canon, la plupart de fonte, sans compter deux à trois cens chameaux légers qui portaient chacun une petite pièce de campagne de la grosseur d'un bon double mousquet. *Bernier, Voyages I, 296.*

§ *J. A. S. B., Vol. XXXVIII, Part I, 1869, p. 40.*



bombardas, also other warlike implements adapted for besieging cities ;”\* but this does not appear to receive support from the Indian historians. Tavernier refers to a tradition of the early knowledge of powder and cannon in Pegu, believed to have been obtained from Asám. Writing of the attack at Asám by the “Grand Capitaine *Mirgimola* (Mír Jumlah) under the orders of Aurangzib, in 1652, (to which, the traveller observes, little resistance was expected, the country having enjoyed peace for five or six centuries, and the people having no experience of war), he says, “On tient que c’est ce même peuple qui a trouvé anciennement l’invention de la poudre et du canon, laquelle a passé d’Asem au Pegu et du Pegu à la Chine, ce qui est cause que d’ordinaire on l’attribue aux Chinois.”† We have seen that, in China, the petroleum of some of its western provinces is said to have been used in old time for a kind of Greek Fire.‡ Asám also, it may be observed, is a petroleum country. Perhaps this may confirm, in some measure, the above suggested explanation of the guns and muskets in Burma. Colonel Symes, in his account of the Embassy to Ava in 1795, considers that the Burmese learned the application of gunpowder from Europeans, though the substance may have been known before. “The musket,” he says, “was first introduced into the Pegue and Ava countries by the Portuguese.”§ Now-a-days Ava receives English muskets.|| In the Note on the intercourse of the Burmese countries with Western nations, in Chapter viii of Colonel Yule’s *Narrative of the Mission to the Court of Ava in 1855*, Portuguese muskets in Burma are noticed in the early part of the 16th century. There is no mention of artillery till 1658, when the guns on the ramparts of Ava, directed against the Chinese invaders, were said to have been served by a party of native Christians, under a foreigner who is, with some probability, supposed to have been an Englishman.¶ But the brief notices, in the chapter referred to, of the narratives of old travellers, were not made with a view to any special enquiry on this subject.

To the Chinese has been attributed, in a more or less indefinite way, a very early knowledge of gunpowder artillery. Gleig, in his “*Sketch of the Military History of Great Britain*”, says that “Robert Norton, the author of a treatise called *The Gunner*, which was published in 1664, \* \* \* quotes Uffano, an Italian traveller in the East, as proving that not only gunpowder but cannon were used so early as the year 83 of our era by the

\* *India in the 15th Century* by R. H. Major. (*Hakluyt Soc.*) *Travels of Nicolo Conti*, p. 31.

† *Voyages de J. B. Tavernier*, II, 427.

‡ D. F. Porter Smith, on the *Oils of Chinese Pharmacy* (quoted above).

§ *Embassy to the Kingdom of Ava in 1795*, II, 60.

|| *Yule’s Mission to the Court of Ava in 1855*, p. 75.

¶ *Id.*, p. 215.



Chinese, and that the alarm created by them was one great cause of the defeat at that time of a Tartar invasion.”\* Few other writers, however, go so far back. The nature of the proof of this early use of cannon is not mentioned. Gibbon says that in China, in the thirteenth century, “in the attack and defence of places the engines of antiquity and the Greek Fire were alternately employed, and the use of gunpowder in cannons and bombs appears as a familiar practice.”† But the absence of all mention by Marco Polo of any such practice, while, in his account of the siege of Siang Yang in 1268 by Kublai, he records the manufacture and employment of mangonels and trebuchets, a short experience of which induced the Chinese garrison to surrender,‡ may throw some doubt on the Chinese knowledge of cannon at that time.

The exclusive and self-isolating practice of China through many ages, and the absence of authentic information regarding its early history, occasion possible errors in two opposite directions,—perhaps crediting the people of that country in early times with a state of advancement in arts and knowledge which they had not attained, perhaps again wrongly imagining them to have continued in primitive backwardness down to recent times. “There must have been a series of ages”, Sir Henry Maine has observed, with reference to matters of a different kind, “during which this progress of China was very steadily maintained; and doubtless our assumption of the absolute immobility of the Chinese and other societies is in part the expression of our ignorance.”§ This is very true; but, on the other hand, this same ignorance sometimes expresses itself in errors of an opposite kind. *Omne ignotum* has, in all ages, been apt to suggest something uncommon or wonderful; and of this kind seems to have been the idea that the Chinese were acquainted, before European nations, with gunpowder and cannon. MM. Reinaud and Favé, who have gone into the matter pretty fully in the work before quoted, thus conclude their statement of the result of the investigation, which leaves little ground for the Chinese claim to stand upon, “Ainsi tombe l’opinion exagérée que s’étaient faite plusieurs savants sur l’art des artifices de guerre chez les Chinois.”||

In the Note by Sir Henry Elliot on the Early use of Gunpowder in India¶ he quotes the opinion expressed by General Cunningham in his Essay on the Arian Order of Architecture (*J. A. S. B., Vol. XVII, Sept. 1848, p. 244*) with reference to the condition of the ruins of some of the old

\* *Sketch of Mil. Hist. of Great Britain*, p. 100.

† *Decline and Fall*, Ch. LXIV.

‡ *Yule’s Marco Polo*, 2nd ed., II, 152.

§ *Lectures on the Early History of Institutions*, p. 227.

|| *Feu Grégeois*, p. 201.

¶ Original Vol. I. Note H, p. 340.



Hindu buildings in Kashmír, particularly those of the temples at Avantipura, that no agency but that of gunpowder could have reduced them to the state of entire destruction and confusion in which the materials of the structures are now found. And this destruction, if it was, as is supposed, the work of Sikandar, designated *But-shikan*, who was reigning at the time of Timur's invasion of India, occurred about the beginning of the fifteenth century. (Otherwise, gunpowder being used, General Cunningham supposes Aurangzib may have been the destroyer.) But other agencies appear sufficient to account for the condition of these buildings. During the interval,—a little more than quarter of a century,—since General Cunningham expressed this opinion, the fingers of Time, and moderate movements of the earth, have been making openings in some of the other old Hindu buildings in Kashmír; and from their appearance it may be believed that these same agencies, together with undermining work applied for wilful destruction, could do what has been done. The little temple of *Páyach*, so complete at the time of General Cunningham's visit on the occasion referred to, has now not only lost the pinnacle he describes,—which is a small matter,—but has its roof-stone, which is a single block, further dislodged than at that time, some of the other stones out of their places, and gaps as wide as two inches in the masonry of the basement, through which can be seen the interior filling of small boulders. At the splendid temple of Martand, the two side buildings which General Cunningham described are now seriously out of the perpendicular, and parts of the lower courses of masonry of the north-east angle of the main building have fallen out, painfully suggesting the probability that, unless measures are taken to re-support it (which it is hoped is now to be done) that corner of the building may ere long come down, and, with it, great part of the walls. If some such work of destruction were done purposely, perhaps suggested by,—partial injury of this kind from natural causes, the ruin might be as complete as that of the buildings at Avantipura. The whole of that country has long been noted for the frequency of earthquakes.\* In the present century they have occasionally been severe. The earthquakes of June and July, 1828, which were repeated almost daily for weeks together, caused much destruction of house property in Srínagar, and large masses of rock are said to have been detached from the hill sides and thrown down. Gunpowder does not seem necessary to account for the ruin of these Kashmír temples.

While there appears to be no good evidence in support of the idea that

\* "Je croirois," says Bernier, speaking of the legends regarding the opening of the Baramula pass by which the Jhelam issues from the placid level of the valley, "Je croirois plutôt que quelque grand tremblement de terre, comme ces lieux y sont assez sujets, auroit fait ouvrir, &c. &c." (*Voyages*, II, 269.) Abul Fazl notices the frequency of earthquakes in Kashmír. (Gladwin's *Ayeen Akbary*, II, 153).



Asia had a knowledge of gunpowder, and used fire-arms, before Europe, there are plain indications that the knowledge of the most improved weapons of war, both before and since the introduction of gunpowder, and the skill to make and to use them, came from Europe to India and other Asiatic countries.

It has been seen above how Kublai Khán employed *Western* engineers to construct and direct the machines he used in the siege of Siang-yang in 1268. The engines used by Sultán Jalál-ud-dín in his attack of the fort of Rantanbhor, A. D. 1290, are called *maghribíhá*, or *Western* (engines).\* In the history of part of the reign of 'Alá-ud-dín Khiljí, from 1296 to 1310 (A. H. 695 to 710), called *Tárikh-i-'Alái*, the author, to illustrate the great strength of the fort of Arangal, says, "if a ball from a western catapult were to strike against it, it would rebound like a nut."† Again, on one face of the fort, it is said the "western engines" succeeded in making several breaches.‡ The account of the same transaction given by Ziá-ud-dín uses this same term *maghribí* for the *manjaníks* used on both sides.§

This indefinite term *Western*, as applied to the mechanical war engines of those days, is narrowed to *Firingíhá* as the designation of gunpowder artillery in Bábar's time. This is the term used in this account of the battle of Pánípat, April, 1526.|| Colonel Tod, in his account of the attack by Bahádur, Sultán of Gujarát, on the fort of Chítór, defended by Ráná Bikramájít, A. D. 1535, (S. 1591) says, "This was the most powerful effort hitherto made by the Sultans of Central India, and European artilleryists are recorded in these annals as brought to the subjugation of Cheetore. The engineer is styled '*Labri Khan, of Frengán*', and to his skill Bahadur was indebted for the successful storm which ensued."¶ It would appear that the employment of Europeans in a similar capacity at a much earlier period with the mechanical war engines is what is meant, in certain old narratives referred to by the same author, though their employment is not distinctly mentioned. He quotes from the "*Sooraj Prakás*" an account of the preparations of the king of Kanauj for opposing an invasion from beyond the Indus, in the 12th century, when "the king of Gor and Irak crossed the Attok", in which it is said that the invading army had

\* *Tárikh-i-Firúz-Sháhi*, of *Zid-ud-dín Barní*, Dowson's *Elliot*, III, 146.

† *Tárikh-i-'Alái*. Dowson, III, 80.

‡ *Id.*, III, 82.

§ *Tárikh-i-Firúz-Sháhi* (*Zid-ud-dín*). *Id.* II, 202.

|| *Erskine and Leyden's Memoirs of Baber*, 306. *Tuzak-i-Bábarí*, Dowson, IV, 255.

¶ *Tod's Annals of Rajasthan*, I, 310.



the aid of "the skilful Frank, learned in all the arts."\* In a footnote Tod adds, "It is singular that Chand likewise mentions the Frank as being in the army of Shabudin in the conquest of his sovereign Pirthiraj."

The note in Erskine and Leyden's translation of Bábar's Memoirs, on the passage above referred to, about artillery at the battle of Pánípat, says of the term '*Feringiha*', "the word is now used in the Dekkan for a swivel."† I am informed by Mr. Shaw, lately our representative in Yárkand, that in a book which he obtained during his residence in Turkistán, relating to events in Yárkand in the beginning of last century, guns are designated *Firingí miltik*. (*Miltik* is the word given for *musket*, in the Vocabulary appended to Sir D. Forsyth's Report of the Mission to Yárkand in 1873.‡ It is perhaps used in a more general way also for fire-arms, like our *gun*.) The same term, *Firingí Miltik*, Mr. Shaw mentions, is now applied to Rifles. It may be inferred that it was for a similar reason that in the other instances above referred to, in earlier times, corresponding terms were used with reference to the engines and engineers, and then to the first gunpowder artillery used in India.

Alike in Asia and in Europe the earlier weapons of war continued, of necessity, to be used long after the introduction of gunpowder artillery, and along with it. The guns, few in number, were at first merely a small but startling addition to the ordinary implements of battle. At Pánípat, when Bábar's *Firingí* field-pieces were causing a new sensation, the smaller fire-arms were not yet in use, and throughout the account of the fight he relates how his troops poured in discharges of arrows on the enemy. When the Zamorin's subjects had become familiar with powder and modern fire-arms, as noticed above, still "in all fights", as Herbert goes on to say, "they also use bow and arrow, darts and targets, granads and variety of fire-works."§ So of course did English bows, long after Creci, play the chief part in fights in which cannons also were brought into play.||

In Europe the fire missiles of the earlier days were both used along with modern guns and discharged by means of them. And the Greek Fire, having its composition and effects modified by gunpowder led the way to the later *balles ardentes* or *pots de feu*, and shells. Fire arrows even were among the kinds of missiles thrown from the early small-bore guns.¶

\* *Tod's Rajasthan*, II, 8.

† P. 306. Also *Dowson's Elliot*, IV, 255.

‡ P. 548.

§ *Some Yeares Travels*, p. 302.

|| Mr. Grant Duff, in his Notes of his recent journey in India, mentions that an officer who accompanied him on his visit to the fort of Láhor (Jan. 1st, 1875) informed him he had had an arrow shot at him during the siege of Multán in 1848. (*Contemp. Rev.*, July 1875.)

¶ *Nap. Louis Bonaparte. Etudes sur le passé et l'avenir de l'Artillerie*, p. 43.



Froissart mentions Greek Fire used with modern artillery by the English at the siege of the castle of Romorantin in 1356. "Si ordonnèrent à apporter canons avant et à traire carreaux et feu grégeois dedans la basse cour." "Adonc fut le feu apporté avant, et trait par bombardes et par canons en la basse cour."\* In their contests with the Moors in Granada, in 1485, the Spaniards threw from their engines large globular masses composed of certain inflammable ingredients mixed with gunpowder, which, "scattering long trains of light", caused much dismay.† The earlier cannon, M. Viollet le Duc says, in his work on the Military Architecture of the Middle Ages, "appear to have been often used, not only for hurling round stones as bombs, like the engines which worked by counterpoise, but likewise for throwing small barrels containing an inflammable and detonating composition such as the Greek Fire described by Joinville, and known to the Arabs from the twelfth century."‡ This application of Greek Fire, or some of these other compositions, is the device which the experienced campaigner, Rittmaster Dugald Dalgetty, brought to the notice of Sir Duncan Campbell of Ardenvohr—"Still however the Captain insisted, notwithstanding the triumphant air with which Sir Duncan pointed out his defences, that a sconce should be erected on Drumsnab, the round eminence to the east of the castle, in respect the house might be annoyed from thence by burning bullets full of fire, shot out of cannon, according to the curious invention of Stephen Bathian, king of Poland, whereby that Prince utterly ruined the great Muscovite city of Moscow. This invention, Captain Dalgetty owned, he had not yet witnessed, but observed that it would give him particular delectation to witness the same put to the proof against Ardenvohr, or any other castle of similar strength; observing that so curious an experiment could not but afford the greatest delight to all admirers of the military art."§ The event which the Captain referred to belongs to the latter half of the sixteenth century. In 1582, this Stephen Bathian or Bathony, king of Poland, made peace with Russia under Ivan II.

We are generally accustomed, now-a-days, to look upon the practical application of any kind of Greek Fire to hostile or incendiary purposes as a thing of the past and only of historical interest. But the extraordinary abundance of the petroleum with which the world is now supplied has fur-

\* *Froissart*, I, 2, 26, quoted by *Reinaud and Favé*, 223; and *Lalanne*, *Feu Grégeois*, 61.

† *Prescott*, *Ferdinand and Isabella*, I, 277. The Catalogue of Arabic Military Works before referred to speaks of the use of cotton dipped in oil, with *daqq-al-harrâqat*, which may mean fire-powder; the burning power of fire arrows being strengthened by the addition of some gunpowder composition of the earlier kind used for fire-works. *Fihrist &c.*, p. 64.

‡ Translation by *M. Macdermott*, p. 170.

§ *Legend of Montrose*, Chap. X.



nished the means, as well as suggested the idea, of its use for this purpose. With all the resources of modern skill and appliances, Greek Fire was brought into use at the siege of Charleston in 1863,—not without some expressions of public disapproval.\* The secret manufacture of Greek Fire in Dublin, for Fenian use, in 1867 received a check by the arrest of the artist. It is not forgotten how burning petroleum was brought into use, in a not very edifying manner, by the communists in Paris in 1870; and since that time by more than one party in Spain.

The occasional revivals of disused weapons and practices of war make but little mark on the line of continuous progress in the art of preparing war fire material. It is likely that the advances from one kind of fire weapon and fire composition to another have all been gradual, and that to no definite time or single individual can be attributed the invention or discovery of either Greek Fire or gunpowder. The usual account of Greek Fire, which implies that it was one distinct and specific composition, is that it was invented by Callinicus, an architect of Heliopolis (Ba'lbek), who deserted from the service of the Caliph to that of the Emperor Constantine *Pogonatus* (the bearded) in the latter half of the seventh century, that its composition was a secret, and the art was preserved at Constantinople, that the secret afterwards passed in some way to the Muhammadans, that the use of the Greek, or, as it may now be called, says Gibbon, the Saracen fire was continued to the time of the invention or discovery of gunpowder, and that the secret has since been lost.† Grose adds another supposition, that it was the invention of Arabian chymists, and the researches made since his time show this to be at least equally likely.

The various preparations for which receipts are given in the Arabic books quoted by MM. Reinaud and Favé have probably all been recognised as forms of the fire compositions which, under whatever name at the time, caused much terror to those against whom they were used, and were afterwards known by the common name of Greek Fire; though the fire so called which was most alarming and destructive was liquid, that is, apparently,

\* A feeling which had been strongly expressed in a less advanced age. MM. Reinaud and Favé quote from a manuscript treatise on the Art of War by Christian of Pisa, in the reign of Charles VI, of France (beginning of the fifteenth century), "Mais comme telles choses à faire ne enseigner pour les maulx qui s'en pourroient ensuivre soient deffendues et excommeniées, n'est bon d'en mettre en livres ne plus plainement en réciter, pour ce qu'à crestien n'appartient user de telles inhumanités qui meesmement sont contre tout droit de guerre." On which the modern authors observe—"Remarquons que l'auteur ne parle pas du feu grec comme d'une chose inconnue, mais oomme d'un moyen de guerre déloyal." *Feu Grégeois*, p. 220.

† Gibbon, *A. D.* 668—675.

*Beckmann's Hist. of Inventions and Discoveries*, IV, 84.

*Grose's Military Antiquities*, II, 309.



was prepared with petroleum. It was not one single mixture compounded after the prescription of Callinicus. Nor does there appear to have been any secret in the matter, nor does the art appear to have been at any time lost.\* Only all people had not command of the most essential materials of the composition, and in particular, of the petroleum or naphtha, which is frequently named as the chief or only combustible thus used.†

With still less certainty can the invention or discovery of gunpowder be assigned to any particular time or person. When it is claimed for Roger Bacon or Berthold Schwartz, it comes to little more than this, that they were attentive students of the chemistry of their time and acquainted with compositions of the nature of gunpowder, and that they recorded what they knew and had seen. It was, however, apparently without knowing or noting the capabilities of gunpowder for application to military purposes.‡ From the various combinations of the ingredients for use in fire-works, the advance was great which resulted in the application of the compound to explosive and projectile purposes, and its preparation in a form suitable for those uses. The discovery of its expansive power would, it might be sup-

\* See Reinaud and Favé, *Chap. VIII*, p. 219, &c.

† A question arises whether a mistake is not made in the use of the term *Greek Fire*; not merely the question suggested by its uncertain history, whether or not it was in any sense of Greek origin, but whether the word "Greek" is the right representation of the term from which it is taken. Is the term "*Greek Fire*" or any exact equivalent, used before the time of the *Crusade Chronicles* in which it appears in the form *Feu Grégeois*? And are the names since used, *Ignis Græcus*, *Greek Fire*, &c., taken from this? Then what is *Grégeois*? The word is almost, if not entirely, limited to this particular application of it. The *Dictionary of the French Academy* says "*Grégeois*. Il n'est usité que dans cette locution, *feu grégeois*, espèce d'artifice dont on se servait anciennement à la guerre," &c. It is not used as a synonym of *Grec*. Can it be connected with any other word? The old French verb *grégier* is thus interpreted in the *Complément of the French Academy's Dictionary*. "*Grégier*, v. a. et n. (V. lang.), Gré-ver, Accabler, Faire tort." And gréver is from *gravis*; (*gréve* = *grief*). (*Diez, Etymological Dictionary of the Romance Languages*, by T. C. Donkin.) A derivation of *grégeois* from *grégier* does not appear impossible or fanciful. May it not have been a descriptive epithet of the fire, *grievous* or *terrible*? Just as in China the material is said to have been known in the tenth century by the name of "*oil of the cruel fire*." (*Grose, II*, 309). The suggestion is perhaps not worth much. But the title of the fire to the name *Greek* does not appear clear.

‡ Not that this would have been set aside as being of no concern to men of their profession. Sir Walter Scott's picture of an energetic monk, technically familiar with the construction and working of the mechanical war engines of his time, while professing that they did not come within the range of his studies, (*The Betrothed*, Chap. VIII) is probably not a mere personal portrait. Inmates of monasteries, as well as other ecclesiastics, of the Middle Ages, while they were the conservators of learning, and the cultivators of the ornamental arts, did not neglect to keep an eye on the arts that pertained to war.



posed, be readily followed by the invention of cannon. Yet though this property of gunpowder was known to Roger Bacon, no form of instrument for applying it to the purpose of propelling missiles of any kind seems to have been known till long after. And the invention of cannon does not appear to be assignable now, any more than that of gunpowder, to any particular individual.\*

The compositions above referred to, for which the Arabs had receipts in times preceding the knowledge of gunpowder artillery in Europe, appear distinctly to have been applied as combustibles,—in fire-works and fiery missiles. They were forms of fire-powder, not gunpowder. And they may have been the first to make them. Colonel Favé, in his *Etudes sur le passé et l'avenir de l'Artillerie*, goes further, however, and says “Les Arabes paraissent avoir été les premiers à lancer les projectiles par la force explosive de la poudre à canon.”† It may be so, but there does not appear to be good evidence of it. They led the way to gunpowder, through Greek Fire and fire-works, and made it, but did not apparently find out, before European nations, its most important form and application.

It has been noticed that the use of modern artillery made very unequal progress in different countries. The use of gunpowder, like that of Greek Fire, was, in its early days, largely dependent on the facilities for procuring the materials and manufacturing the powder, or on the facilities for obtaining the powder ready-made from other countries. With communications imperfect and tedious, supplies of gunpowder would be uncertain. An Eastern traveller in the beginning of the seventeenth century says that at that time a place in the neighbourhood of Achin “supplies in a manner all the Indies with sulphur to make powder of.”‡ This was rather a wide general statement. In Scotland, a few years after the time of which this traveller writes, it is recorded, under date July 19th, 1626, that “amongst the preparations for war at this time, the Privy Council, reflecting on the inconveniences of being wholly dependent on foreign countries for gunpowder, empowered Sir James Baillie of Lochend, Knight, to see if he could induce some Englishmen to come and settle in Scotland for the manufacture of that article.”

\* History says nothing in support of the pretensions of Butler's claimant “Maggano, great in martial fame”,

Of warlike engines he was author,  
Devised for quick dispatch of slaughter.  
The cannon, blunderbus, and saker,  
He was th' inventor of, and maker.

*Hudibras, Part I, Canto 2.*

† Quoted in *Quarterly Review*, July 1868. Art. IV. “Gunpowder.”

‡ *M. Beaulieu's Voyage to the East Indies*, A. D. 1619. *Harris's Collection*, II, 250.



The arts pertaining to weapons and munitions of war spread now over a wide field. In the line on which they were started by the introduction of gunpowder they have made great advances in the hands of different nations of Europe. With no essential change, of the kind which took place when gunpowder artillery came into use, the minute improvements in execution, and careful attention to accuracy, in modern times, and particularly in the present century, have made changes nearly as important. Great as the difference between the old and the new war engines, in the days when they worked together, as great probably are the differences of another kind between Bábar's *firingí* field-pieces at Pánípat and the Armstrongs of the present day.

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*Were the Sundarbans inhabited in ancient times?*—By H. BEVERIDGE,  
B. C. S.

This is a question which has excited a great deal of attention. The Bengali mind as being prone to the marvellous and to the exaltation of the past at the expense of the present, has answered the question in the affirmative and maintained the view that there were formerly large cities in the Sundarbans. Some Bengalis also have suggested that the present desolate condition of the Sundarbans is due to subsidence of the last, and that this may have been contemporaneous with the formation of the submarine hollow known as the "Swatch of no ground". It seems to me, however, to be very doubtful indeed that the Sundarbans were ever largely peopled, and still more so that their inhabitants lived in cities or were otherwise civilized. As regards the eastern half of the Sundarbans, namely, that which lies in the districts of Bákírganj and Noákhálí and includes Sondíp and the other islands in the estuary of the Megna, it seems to me that the fact of so much salt having been manufactured there in old times militates against the view of extensive cultivation; for the salt could not have been made without a great expenditure of fuel, which of course implies the existence of large tracts of jungle. Du Jarric speaks of Sondíp as being able to supply the whole of Bengal with salt, and it seems evident that in old times salt was reckoned as the most valuable production of this part of the country. How inimical this must have been to a widespread cultivation of the neighbouring tracts may be judged of from the fact that in modern times the salt manufacture by Government was a great obstacle to the clearing and colonization of the churs and islands, as the Government officers insisted on the jungles being maintained for salt-manufacture. The zamíndárs also of Dakhin Shahbázpur obtained, as I have elsewhere stated, a large reduction of their land revenue on account of part of their lands being taken up for the use of the salt works.